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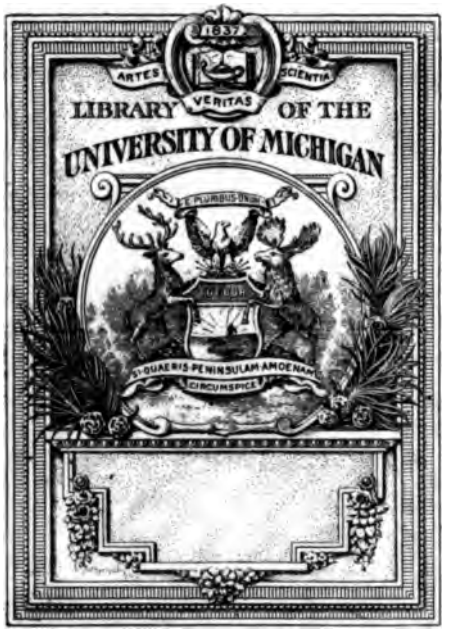
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PROCEEDINGS

OF THE

ACADEMY OF NATURAL SCIENCES

OF

PHILADELPHIA.

1866.

PHILADELPHIA:
PRINTED FOR THE ACADEMY.
1866.

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PROCEEDINGS

OF THE

ACADEMY OF NATURAL SCIENCES

OF

PHILADELPHIA.

1866.

January 2d.

The President, DR. ISAAC HAYS, in the Chair.

Twenty-two members present.

Dr. Leidy called the attention of the members to the greater part of a human skull, and a shell medallion, presented this evening by Col. A. W. Putnam, of Nashville, Tenn. The specimens were obtained from one of the so-called pigmy graves of an ancient aboriginal cemetery near the mouth of Stone River, Davidson Co., Tenn.

The part of the skull consists of nearly the entire cranial portion, and does not differ in general form, proportions and size, from that of the usual North American Indian skulls. The occipital region is high, somewhat compressed, and laterally deformed. The medallion is a circular piece of shell, about two inches in diameter, and is much eroded. It appears to have been covered with some pigment. One side is plain; the other is marked with cross bars contained within a linear circle. The upper edge is perforated with two holes.

Dr. L. read an extract from an article by Col. Putnam, in relation to the specimens and the so-called pigmy race of Tennessee, published in the *Nashville Dispatch*, Dec. 12, 1865. The substance of the extract is as follows:

The ancient cemeteries in middle Tennessee are peculiar from the construction and small size of the graves, which have given rise to the idea that they belonged to a people of small stature. The graves are near the surface, and so far as examined by Col. Putnam, or observed by the owners of lands on which they are situated, and where the plow has uncovered them, are of quite uniform structure. A few flat stones at the bottom, generally a single one at the head and foot, and a variable number at the sides. The grave thus prepared, after receiving the human remains, was filled with earth to the depth of one or two feet, and was then covered with one or more flat stones, though not in all instances. Col. Putnam supposes that recent dead bodies were not deposited in their graves, but were exposed, according to the custom of some of the later Indian tribes, on high scaffolds, or suspended to trees, in the open air, until the soft parts had decayed, after which the bones were collected and deposited in the stone graves. This would explain the reason of the small size of the latter in comparison with the length of the entire skeletons contained therein, and appears to receive confirmation from the fact that these graves, notwithstanding their very superficial position, never appear to have been disturbed by wild animals, which they likely would have been had the bodies been buried in the fresh condition.

The following deaths were announced :—Col. J. D. Graham, U. S. A., Dec. 29, 1865, and Hon. Henry Winter Davis, Dec. 30, 1865, Correspondents, and Adolphus L. Heermann, M. D., Member, Sept. 2, 1865.

January 9th.

The President, DR. HAYS, in the Chair.

Twenty-one members present.

Dr. Slack directed the attention of the members to some interesting specimens of fossils, and chalk of the cretaceous period, from Smoky Hill River, Colorado Territory, presented this evening by Mr. D. C. Collier.

January 16th.

MR. VAUX, Vice-President, in the Chair.

Twenty-one members present.

January 23d.

MR. VAUX, Vice-President, in the Chair.

Seventeen members present.

The following deaths were announced :—Mr. Robt. Pearsall, Member, January 25, 1866; and Dr. John L. Riddell of New Orleans, and Dr. John L. Lindley, of London, Correspondents.

January 30th.

MR. VAUX, Vice-President, in the Chair.

Thirty members present.

A letter to the President was read, as follows:

PHILADELPHIA, *January 19th*, 1866.

The President of the Academy of Natural Sciences of Philadelphia.

SIR,—I am prepared to pay a legacy of ten thousand dollars, (less U. S. tax) left to the above Institution by the will of my late brother, Thomas B. Wilson, deceased, and have enclosed herewith a release, to be signed and acknowledged, &c., before a Commissioner of the State of Delaware; when executed, please advise me where and when we can meet to close the transaction.

Yours, respectfully,

RATHMELL WILSON, *Exc'r.*,
of THOMAS B. WILSON, *Dec'd.*

Address 919 Clinton street.

The death was announced of Mr. George Ord, Jan. 23, 1866, formerly President of the Academy.

The following gentlemen were elected members of the Academy: Mr. Edwin L. Reakirt, Mr. Robert Fraser, Mr. Jas. H. B. Bland,

[Jan.

Mr. George W. Childs, Mr. George M. Woodward, Mr. Thomas Guilford Smith, Mr. William Forster Jones, and the Rev. E. R. Beadle.

Pursuant to the By-Laws, an election of members of the Standing Committees for the ensuing year was held, as follows:

ETHNOLOGY.
J. A. MEIGS,
S. S. HALDEMAN,
F. V. HAYDEN.

COMP. ANAT. AND GEN. ZOOLOGY.
H. ALLEN,
W. S. W. RUSCHENBERGER,
J. H. SLACK.

MAMMALOGY.
J. H. SLACK,
E. D. COPE,
H. ALLEN.

ORNITHOLOGY.
J. CASSIN,
S. F. BAIRD,
HENRY BRYANT.

HERPETOLOGY AND ICHTHYOLOGY.
E. D. COPE,
TH. NORRIS,
ROBERT BRIDGES.

CONCHOLOGY.
GEO. W. TRYON, JR.,
ISAAC LEA,
T. A. CONRAD.

ENTOMOLOGY AND CRUSTACEA.
JNO. L. LE CONTE,
J. H B. BLAND,
H. C. WOOD, JR.

BOTANY.
ELIAS DURAND,
C. H. PARKER,
C. E. SMITH.

GEOLOGY.
ISAAC LEA,
J. P. LESLEY,
F. V. HAYDEN.

MINERALOGY.
W. S. VAUX,
J. C. TRAUTWINE,
J. A. CLAY.

PALÆONTOLOGY.
T. A. CONRAD,
JOSEPH LEIDY,
F. V. HAYDEN.

PHYSICS.
ROBERT BRIDGES,
R. E. ROGERS,
JACOB ENNIS.

LIBRARY.
JOSEPH JEANES,
JOSEPH LEIDY,
JOHN CASSIN.

PROCEEDINGS.
JOSEPH LEIDY,
W. S. VAUX,
JOHN CASSIN,
ROBERT BRIDGES,
GEO. W. TRYON, JR.

February 6th.

MR. VAUX, Vice President, in the Chair.

Twenty-eight members present.

The following was presented for publication: "A Critical Review of of the Family Procellaridæ," by Elliot Coues, M. D., U. S. A.

Prof. E. D. Cope presented to the Academy a specimen of Nautilus, obtained by him from the owner of "Heritages," Marl Pits, Glassboro, New Jersey, who stated to him that it had been found in those diggings. The identity of the matrix with that surrounding specimens of Teredo tibialis, and Terebratula

fragilis and Harlani, taken from that bed by Prof. C., seemed conclusive on this point. The species is an Aturia, and the first found in the cretaceous formation of New Jersey, though W. M. Gabb had discovered one perhaps the same in the cretaceous of California. It has some resemblance to the *zic-zac*, but presents fewer and more distant septa, longer chambers, and the parietal processes of the septa more divaricate and less dorsally situate. It differs from the A. Alabamensis (Morton) by the same features, and in the smaller siphuncle and much less parallel septa. The following are its characters:

Uncovered chambers nine; septary process elongate, acuminate, shallow, diverging outward from a spiral line joining their bases; well separated from the succeeding septa; dorsal portions of the septa short, very excentric as regards each other; ventral portions opposite them, forming nearly a right angle with the ventral outline. Siphuncle small, more dorsal than the end of the dorsal fourth of the diameter. Ventral face broad rounded; septal processes scarcely visible on the ventral view. Diameter of the last chamber 3 in. 11 l.; of first visible (at siphuncle) 22 l. Median diameter (from penultimate chamber) 8 inches.

This species most resembles Nautilus Parkinsoni, which cannot be far removed from Aturia. In it the septary process approaches closely the succeeding septum; while in the A. pancifex they fall far short of the latter, and are more divaricate; the siphuncle is less dorsally situate, measuring one-fourth the diameter in the former. In A. Agustata, Conrad, from the Eocene of Oregon, there is much resemblance, but that animal is much more like the *zic-zac;* its septary processes are not divaricate and but little separated; the dorsal portion of the septary wall instead of being opposite its ventral portions is opposite that of the septum next anterior. The nearest ally is the A. Mathewsonii Gabb. It appears to differ in the small siphuncle, and obliquely truncate and divaricate septary processes, and the relatively much shorter median or central portion of the septary margins. My friend T. A. Conrad's opinion as to the peculiarities of this species is confirmatory of my own.

Dr. Leidy read several extracts from a letter of Dr. Gideon Lincecum, addressed to Mr. Durand, dated Long Point, Texas, Dec. 24, 1865. One of the extracts related an interesting account of an ant battle, witnessed by Dr. Lincecum, as follows:

"The large, black tree ants have exceedingly destructive wars sometimes with their own species. Like the honey bee, they maintain separate and distinct governments, or hives, and between these, as far as my observation goes, there is no commerce or intercourse of any description. But they have territorial claims and quarrels; and these quarrels are occasionally decided on the battle field. As they are equal in physical strength and the science of war, the amount of life that is destroyed in one of their national conflicts is sometimes very great. I have seen left on one of their battle fields at least a gallon of the slain. They were not dead, but they were in a far more lamentable condition. Their legs having been all trimmed off; they lay on the ground amongst the scattered fragments of their dissevered limbs, wallowing and writhing their legless bodies, in an agony of sullen, mad, hopeless despair.

This disastrous engagement took place in the little front yard of my office, on the evening of the 10th of July, 1855. There were considerable numbers engaged in battle when I first observed them. They were madly fighting in a hand to hand conflict, and reinforcements were momentarily arriving to both armies. The battle had now become general, and was raging over an area of 15 to 20 feet in diameter. It was 4 P. M., and placing a chair in a convenient situation for observation, I seated myself, for the purpose, if possible, of ascertaining the cause of the difficulty, and to note their mode of warfare. I was not present at the commencing of the battle, and now, while it was wildly raging, could not find out the cause of it. It was not long, however, until I

discovered that the belligerent parties were the subjects of two neighboring kingdoms, or hives, each of which, as I could distinguish, by the arrival of their reinforcements, were coming from two different post-oak trees, which were standing about fifty yards apart, and the office-yard being very nearly the half-way ground, afforded me good opportunity to determine that the contending parties belonged to distinct communities, and not to the same hive.

The battle continued unabated, until the darkness of the night prevented further observation. I left them to their fate, with my feelings so highly excited that I did not rest well that night. Before sunrise the next morning I visited the battle field, and found it thickly strewed with the legless, hapless warriors, as described above. There could not have been less than 40,000 left on the ground who were utterly incapacitated to help themselves. A few of them had a single leg left. With this they made shift to pull themselves incessantly around in a very limited circle. The larger proportion of them lay prostrate, writhing and doubling, and vainly straining their agonized, limbless bodies in a state of mental abandonment and furious desperation. Few were dead. All the dead ones that I saw, did not exceed perhaps a hundred; and these were found universally in pairs, mutually grappling each other by the throat. With a few of these pairs of unyielding warriors, life was not entirely extinct. My sympathies being painfully excited, I made an effort, where there were signs of vitality, to separate them. In this I did not succeed. On closer scrutiny, I found that they had fixed their caliper-like mandibles in each others throat, and were gripped together with such inveterate maligaity, that they could not be separated without tearing off their heads.

I had swept them up in a heap, and as the most humane method of curtailing the wretched condition of the poor, ruined victims of the bloody strife I could think of, was making a hole in the ground, with the intention of entombing the whole of them, Whig and Tory together, and by filling the grave with water, drown them. But before I had completed my arrangements, there came a heavy shower of rain, which soon overwhelmed them with mud and water, thereby relieving me from the painful task.

It is perhaps nothing amiss to state here, that among the slain—the vanquished—I saw no type of the species, except the neutrals, or working type. As on the ensanguined fields of the arrogant genus homo, the conjuring priests and better bloods of the self-created nobility, after raising the *fuss*, had found it convenient to have business in some safer quarter.

This ant dwells in live trees, in large swarms, or more properly communities, and feeds principally on insects. On this account he is useful. It is a fortunate thing for any family to have a large tree near their dwelling that contains a community of this civil but warlike species of ant.

Near the western corner of my dwelling, for eight years, stood a post oak tree—*Quercus obtusiloba*—which contained a quite populous community of the black tree ant in question. During the eight years that the tree survived, it was the custom of these ants to visit every portion of the house, every night in warm weather; search out all hidden cracks and crevices, in walls, bedsteads, and furniture, in fact, travel over every thing about the house, except the clothing; upon any woven texture they do not travel. In all that eight years, we had no fleas, bed bugs, or any other insect annoyances. But when the tree died, in which they had their home, they went away, and we have missed them much, as, since their departure, we have been forced to scald and wash out the house often, to clear it of annoying insects. We should be happy in the acknowledgment of our dependence on the services of another such community.

This species of ant is the largest that is found in Texas. He is quite black, and disdaining the grovelling habits of the burrowing tribes of the genus, he constructs his habitation in the live trees. As far as my observation goes, however, he dwells only in the cedars and post oaks. Very seldom found in a tree that has been long dead. In the construction of the habitation for the

accommodation of the community, he displays a degree of forethought, skill and ingenuity, which is arrogantly claimed to belong only to the genus homo.

In the first place, a single female winged ant selects a live tree, in a locality favorably situated for the peculiar habits of the species, and the growth of the insects upon which it feeds mainly. She now seeks out some small crevice, dead limb, or wind crack in the tree, and cutting off her wings, which are no longer useful, but in the way, she commences the work of boring and chiseling out suitable apartments for the coming community. This she accomplishes by cutting away the firm, sound wood of the growing tree, until she has completed a sufficient number of apartments, or cells, in which to deposit her eggs, and this ends her labors. Very soon—12 days—she has produced a swarm of neutrals, who go to work collecting food and extending the cells to suit the growing population, until, as I have often witnessed, the inner portion of the tree will be cut into singularly constructed cells to the extent of 6 or 7 feet, without greatly diminishing its strength."

Other extracts from the letter, in relation to certain species of grapes of Texas, are as follows:

"I am familiar with Buckley's V. monticola, and am pleased that it has at last been named, and placed in scientific classification. I am not right sure that all the Texas grapes have yet been noted. I think it quite probable that future industry and close scientific scrutiny will develope other species and varieties, particularly when the investigator penetrates the valleys and gulches of our exceeding rough mountain ranges."

"In reference to the Post oak grapes, there are two species here that are known among the people as the '*Post oak grape.*' They are found in the Post oak lands. The one I sent you flourishes best in the very sandy elevations, with the bitter-fruited Post oak. This species does not rise exceeding four or five feet; it is more of a bush than a vine. The berry is large and sour, but its odor is very fine. The other species is sometimes found in the same soil, alongside of the first, but more frequently in better soil, always, however, in Post oak lands, which as a general thing, are more or less sandy. This species is a climbing vine, running over the tops of the trees, bearing heavy crops of large grapes. These are also too sour for a table grape; they produce a very palatable wine, which, very probably, might be greatly improved by cultivation."

"Mr. G. J. Durham, (my son in-law,) examined your description of the Vitis monticola to-day. He says Buckley is right about it being the best American grape, but has never seen such large clusters as you describe; has eat of the fruit, which he describes as maturing in September; that the berry when ripe, is of a medium size, bright green, sprinkled with black dots, very sweet, and that the vine sometimes attains to the height of ten or eleven feet. It is almost universally found among, and clambering on the rocks, on dry limestone elevations. That it is not very abundant, &c., all of which I know to be correct. The other small mountain black grape is more abundant, and is also quite sweet. It occupies lower grounds than the V. monticola, being found mostly in the heads of the ravines, running on the dogwood trees in such quantities, that he, Durham, has seen them, towards the latter part of September, when the leaves had all shed off, and in many places where the vines had matted the tops of the dogwoods, impart a blue caste to the whole scenery, even at a mile's distance. Companies of soldiers have been known to subsist upon them alone, two or three days at a time, and no ill results arose from it. This last grape is called by the people of that country, 'sugar grape,' and is highly esteemed by all who have a knowledge of it. They will travel a great way at the proper season to procure them. The soldiers who are stationed in or near the mountains will go 30 or 40 miles after them. And yet, I have never heard of an attempt to domesticate either of the mountain species.

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It is at least 150 miles from my place to where they are found in any degree plenty. The excursions I have made in that direction have always been during the summer months, consequently I have only seen them in about a half-grown state. All the mature fruit I have seen were brought by travellers from that country."

February 13*th.*

MR. VAUX, Vice-President, in the Chair.

Thirty-four members present.

The following deaths were announced:

Mr. Charles A. Poulson, Feb. 8, Member. Dr. William P. Grier, U. S. A., Jan. 28, Member. Mr. Lovell Reeve, of London, Correspondent.

February 20*th.*

MR. VAUX, Vice-President, in the Chair.

Twenty-five members present.

February 27*th.*

MR. CASSIN, Vice-President, in the Chair.

Twenty members present.

The Committee on Proceedings placed on the table the fifth number of the published Proceedings, for November and December, 1865.

The following gentlemen were elected members of the Academy: Mr. William R. White, Mr. John E. Graeff, Mr. William Evans, Jr., Mr. Edward R. Wood, Mr. Philip C. Garrett and Mr. Charles Hartshorne; and Mr. Geo. W. Clinton, of Buffalo, N. Y., was elected a Correspondent.

March 6*th.*

DR. BRIDGES in the Chair.

Sixteen members present.

March 13*th.*

MR. CASSIN, Vice-President, in the Chair.

Twenty-four members present.

Mr. Lea read an extract from a letter of Prof. Courtland, on the gradual extinction of the western Unionidæ.

A paper was presented for publication, entitled "A List of Birds of Arizona, &c.," by Elliot Coues, M. D., U. S. A.

Prof. E. D. Cope exhibited a cranium of a Black Fish (Globicephalus) found on the western shore of Delaware Bay by Cornelius Gregory. Comparison

with an example of the same genus from Cape Cod, revealed differences which must probably be regarded as distinctive of two species. The latter is apparently identical with the known species G. melas (or *swineval*), and agrees with Harlan's description of *G. intermedius*, and in locality; the Delaware specimen is of much broader and shorter proportions than any known species, exhibits a narrower supraorbital roof and shorter tooth line. The intermaxillaries dilate and entirely cover the maxillaries at the basal two-fifths of the muzzle, which then rather abruptly contracts to the tip.

G. ——— ? sp. nov.	G. melas.
End of muzzle to end malar to length cranium, 2 to 4.5.	End of muzzle to end malar to length as 2 to 4·5.
Width at basal fourth equal from notch to supraoccipital and 5-6ths length of muzzle.	Width do. four fifths from notch to supraeccip. crest.
Outlines begin to contract at basal 2-5ths.	Outlines continuous, nearly parallel.
Width at distal fourth equal ⅔ length muzzle.	Width do. less than half length.
Supraoccipital everted to foramen magnum.	Supraoccipital straight to foramen magnum.
Longitudinal width supraorbital roof, ⅔ width muzzle at basal third.	Longit. width supraorb. equal width, muzzle at basal third.
Length of alveolar series scarcely more than half width of muzzle at seventh tooth.	Length do. equal width, muzzle at 7th tooth.
Teeth above, six.	Teeth above, ten.

Dr. Gray (Catal. Cetaceous Brit. Mus.,) describes a specimen from Guadaloupe in Mus. Paris, which has the maxillæ similarly concealed by the premaxillaries. The present individual is an adult male, with the ligamentous attachments on the muzzle, and muscular insertions largely developed. Total length 25 in. 6 lin.; postorbital width (above.)

The whale alluded to (Proceedings, 1865, p. 168) as having been seen in Mobjack Bay, Virginia, was stated to have been captured by Dr. P. A. Taliaferro and Prof. E. Taliaferro, of William and Mary College, Williamsburg, and prepared and set up. It is a short-finned Megaptera, probably of the species M. osphyia. Prof. T. has kindly furnished me with the following details as to its structure, carefully drawn up by himself.

Length from end of muzzle over convexity of back, forty-three feet nine inches; girth about nineteen feet; length from end of muzzle to axilla (external measurement) fifteen feet; breadth of head across inferior margin of jaws, eight feet. Length of the pectoral extremity *four feet;* greatest breadth nfteen inches; they were situated close behind the angle of the mouth. There were three hundred and sixty laminæ of baleen, extending on either side of the mouth about six feet along the jaw, the longest about eighteen to twenty inches. The head was acute. The folds of the throat many and capacious. The dorsal fin was represented by a conical mass covered by horny integument, without any membranous appendage, situated well posteriorly. The body near the tail very slender. The flukes suddenly expand to a breadth of ten feet. The cervical vertebræ were all distinct. Color: jet black above, white on the belly; sides beautifully marbled by the combination of the two colors.

The most striking feature in this specimen is the shortness of the pectoral limbs, being relatively nearly half less than in the specimen of the osphyia at Niagara, one-half the length of the cranium, and only one-tenth the total. This is very different from any of the hitherto known species, and without doubt distinct.

March 20th.

MR. CASSIN, Vice-President in the Chair.

Twenty-seven members present.

The following were offered for publication:

"List of the Birds of Fort Whipple, Arizona." By Elliot Coues, M.D.

"Description of twelve Unionidæ from South America." By Isaac Lea.

"Fasti Ornithologiæ, No. 2." By John Cassin.

Dr. Leidy directed the attention of the members to the specimen of a large phalanx of an extinct reptile, presented this evening by Dr. W. Spillman, of Columbus, Mississippi. It was derived from the cretaceous formation in the vicinity of the latter place, and is remarkably well preserved. It is a first phalanx, and in general form resembles the corresponding phalanges of the Alligator, but is proportionately more robust. The proximal articular surface is moderately concave, somewhat uneven; and in outline is transverse oval with the lower side flat. The distal extremity is provided with a trochlear articular surface, and deep pits laterally for ligamentous attachment. The animal to which the bone belonged is unknown; it may be conjectured to have appertained to the fore foot of Hadosaurus. The measurements are as follows: Length in the axis 5 inches 8 lines; length laterally 6 inches; transverse diameter of proximal end 2 inches 11 lines; vertical diameter of do. 2 inches 5 lines; transverse diameter of distal end inferiorly 2 inches 5½ lines; vertical diameter at middle of trochlea 1 inch 6 lines.

Dr. Leidy next directed the attention of the members to a specimen of the liver of a turkey suspended in alcohol, containing half a dozen cream-colored tumors, from the size of a pea to that of a nutmeg. The tumors examined microscopically appear to have the structure of soft cancer, as usually described, being composed of large nucleated cells in great variety of form. Dr. L. stated that, after having dined on part of the turkey, on making inquiry for the missing liver, the cook had given information, that in consequence of the "white lumps in it, it had not been cooked." On procuring it from the slops, it was found to be in the condition described. Dr. L. took the opportunity of expressing the opinion that an unnecessary degree of alarm had been created in the community in relation to what were considered to be diseased meats, especially such as are infested with parasites. While he most decidedly recommended the avoidance of the flesh of diseased or unwholesome animals, he thought that all parasites would be destroyed by thorough cooking.

In answer to a question from one of the members, whether he had noticed Trichina in pork, Dr. L. observed that he had been the first to discover this parasite in the hog; the discovery having been made twenty years ago, as may be seen by referring to the Proceedings of this Academy for October, 1846, page 107—8. This notice had attracted the attention of the German helminthologists, as proved by reference to Diesing's Systema Helminthum, vol. ii. page 114, and Leuckart, Untersuchungen ü. Trichina spiralis, pages 6, 18.

The circumstances under which the Trichina had been first detected in pork, was on an occasion when Dr. L. had dined on part of the infested meat. While eating a slice of pork, he noticed some minute specks, which recalled to mind the Trichina spots seen in the muscles of a human subject only a few days previously. Preserving the remainder of the slice, on examination of it microscopically, he found it full of Trichina spiralis, but the parasites were all dead from the heat of cooking. In conclusion, Dr. L. observed that all meats were liable to be infested with parasites, but that there was no danger from infection if the meats were thoroughly cooked, for he had satisfied himself by experiment that entozoa are destroyed when submitted to the temperature of boiling water.

March 27th.

MR. CASSIN, Vice-President, in the Chair.

Twenty-four members present.

The following gentlemen were elected members:

J. A. Heintzelman, Amos R. Little, James C. Parrish, Clemmons Hunt, R. Shelton Mackenzie, Charles B. Durborrow, John Turner, Samuel E. Slaymaker, William E. Kehmle, Alfonso de Figaniere, Thomas C. Stellwagen, M. D., and Charles S. Westcott.

The following were elected correspondents:

Robert Gray and William Sinclair, of Glasgow, Scotland; D. C. Collier, of Central City, Colorado; and Rev. Joseph Blake.

On report of the respective committees, the following papers were ordered to be published:

A STUDY OF THE ICTERIDAE.

BY JOHN CASSIN.

1. Sub-family AGELAIINAE.

1. Genus *AGELAIUS*, Vieillot.

(Genus Agelaius, Vieill, Analyse, p. 33, 1816.)

1. *Agelaius.*

1. AGELAIUS PHŒNICEUS (Linnæus.)

Oriolus phœniceus, Linn. Syst. Nat. i. p. 161, (1766.)

Sturnus praedatorius, Wils. Am. Orn. iv. p. 30, (1811.

Wilson Am. Orn. pl. 30. Aud B. of Am. pl. 67, Oct. ed. iv. pl. 216.

An abundant and well known species, diffused throughout the whole of temperate North America. It is nearly related to the two species immediately succeeding, from which it is, however, generally not difficult to distinguish, though all of them much resemble each other when in young plumage. Numerous specimens are in the Acad. Museum, and in the Museum Smithsonian Institution, Washington. Specimens from Yucatan, in the Smithsonian Museum, have the bill more slender and present some other slight differences, and may be distinct or referable to *A. assimilis*, Gundlach.

2. AGELAIUS TRICOLOR, Audubon.

Agelaius tricolor, Aud. Orn. Biog. v. p. 1. (1839.)

Aud. B. of Am. pl. 388, Oct. ed.. iv. pl. 214.

Numerous specimens in the Academy Museum, and in that of the Smithsonian Institution. Resembles the preceding but is quite distinct specifically, and can be distinguished readily by the different red of the shoulders, less rounded tail and more slender bill, in the present bird. Abundant in the western countries of North America.

3. AGELAIUS ASSIMILIS, Gundlach.

Agelaius assimilis. "Gundl. MSS.," Lembeye, Aves Cuba, p. 64, (1850.)

Agelaius assimilis, Gundl. Cabanis Jour. 1856, p. 12.

Lembeye, Aves Cuba, pl. ix. fig. 3.

Restricted apparently to the Island of Cuba, but in the adult male much resembling specimens from Yucatan. In this species the female is totally black in which respect it differs from the two preceding species, though the adult male is very similar to that of A. *phœniceus*. The young male resembles the female, but is usually recognizable by the presence of more or less of the scarlet of the shoulders.

Specimens in the Museum of the Smithsonian Institution, and in the collection of Mr. Lawrence of New York. The females and young males are uniform brownish black, not in the smallest degree mottled, as in the two preceding species and in *A. Gubernator*.

4. AGELAIUS GUBERNATOR, (Wagler.)
Psarocolius gubernator, Wagl. Isis, 1832, p. 281.
Aud. B. of Am. pl. 420, Oct. ed. iv. pl. 215.
Easily distinguished when adult from either of the preceding by its shoulders being uniform rich crimson, without paler margin, though the young much resemble each other. Abundant in western North America.
Numerous specimens in Academy Museum and Museum Smithsonian Institution.

5. AGELAIUS HUMERALIS, (Vigors.)
Leistes humeralis, Vig. Zool. Jour. iii. p. 442, (1827.)
La Sagra Cuba, Ois. pl. 5.
Now well known as a bird of the Island of Cuba. This species is smaller than either of the preceding, and not quite strictly of the same subgroup, having the tail proportionally rather longer and general form apparently more slender. Common in Cuba. Numerous specimens in the Academy Museum, and Museum Smithsonian Institution, and in Mr. Lawrence's collection.
In this species the females and young males are stated to be black, (as in *A. assimilis*, also of Cuba.) A specimen in Mr. Lawrence's collection, which I regard as a young male of this species, is clear uniform black, the rufous of the shoulder beginning to appear.

2. *Xanthocephalus.*

(Genus Xanthocephalus, Bonap. Consp. Av. 1. p. 431.)

6. AGELAIUS XANTHOCEPHALUS, (Bonaparte.)
Icterus xanthocephalus, Bonap. Jour. Acad. Philad'a. v. p. 223, (1827.)
Agelaius longipes, Swains. Phil. Mag. 1827, p. 436.
Psarocolius perspicillatus, Wagler, Isis, 1829, p. 753.
Icterus icterocephalus, Bonap. Am. Orn. 1. p. 27, (supposed by Bonaparte, to be *Oriolus icterocephalus*, Linn.)
Icterus frenatus, Licht., Isis, 1843, p. 69.
Bonap. Am. Orn. 1. pl. 3. Aud. B. of Am. pl. 388, Oct. ed. iv. pl. 213.
In my judgment this species is properly to be arranged as an *Agelaius* It is an abundant bird of the central and western countries of North America, and specimens are in all collections in this country, though formerly scarce and highly valued. Straggling specimens, generally of young birds, have occasionally been obtained in the States on the Atlantic, several having occurred, within my knowledge, in the vicinity of Philadelphia.
This species does not resemble any other sufficiently intimately to render close comparison necessary, and can usually be recognized quite readily. It is handsomely figured by Audubon, and by Bonaparte as above.

3. *Aphobus.*

(Genus Aphobus, Cabanis, Mus. Hein, i. p. 194.)

7. AGELAIUS CHOPI, Vieillot.
Agelaius chopi, Vieill. Nouv. Dict. xxxiv. p. 537, (1819.)
Icterus unicolor, Licht. Verz. p. 19, (1823.)
Icterus sulcirostris, Spix. Av. Bras. i. p. 67, (1824.)
Spix Av. Bras. i. pl. 64. Hahn Voeg. pt. xvi. pl. 2.
Specimens obtained by Mr. John G. Bell, at Mazatlan, Mexico, have the bill larger and in general stature are rather more robust than in specimens labelled as from various parts of South America, but otherwise are quite identical. Easily identified in this group by the sharply lanceolate and acuminate form of the feathers of the head and the oblique grooves at the base of the lower

mandible. My impression at present is, that this bird is properly to be arranged here as a subgenus of *Agelaius*.

Numerous specimens in the Academy Museum. In general appearance and in the pointed feathers of the head this bird resembles *Leistes curaeus* (=*Curaeus sterrimus*) with which it has been sometimes confounded, though much smaller and not, in my opinion, belonging to the same genus.

4. *Agelasticus.*

(Genus Agelasticus, Cabanis, Mus. Hein, i. p. 188.)

8. AGELAIUS THILIUS, (Molina.)

Turdus thilius, Mol. Sagg. Stor. Nat. Chili, (1782.)

Xanthornus chrysocarpus, Vigors, Proc. Zool. Soc. London, 1832, p. 3.

Thilius major, Bonap. Compt. Rend. 1853, p. 833.

Gilliss, U. S. Astr. Exp. Chili, Birds, pl. 16.

Numerous specimens from Chili in the Academy and Smithsonian Institution. So far as I can see, this bird is an *Agelaius*, presenting only somewhat greater attenuation of form than in the more typical species, and in my judgment it is the type of a subgeneric group quite identical with *Neopsar*, Sclater. This species intimately resembles the next succeeding but is larger.

9. AGELAIUS XANTHOCARPUS, Bonaparte.

Agelaius xanthocarpus, Bonap. Consp. Av. i. p. 430, (1850.)

"Icterus chilensis, Kittlitz." Bonap. Compt. Rend. 1853, p. 834.

This is a black species with yellow shoulders, much resembling the preceding (*A. thilius*) and apparently to be distinguished mainly by its smaller size. It is scarcely to be recognized from the Prince Bonaparte's description in Consp. Av., as cited above, but is clearly indicated by the same distinguished Naturalist in Comp. Rend. 1853, p. 833. This bird seems to be constantly smaller than the preceding, with the bill disproportionately more slender, the wing shorter and the proportionate lengths of the quills different.

Specimens of this species in the Mus. Smiths. Inst., from Capt. Page's La Plata Expedition, were obtained at Buenos Ayres and Santa Fe, Argentine Republic.

(Genus Neopsar, Sclater, Cat. Am. Birds, p. 139)

10. AGELAIUS NIGERRIMUS, (Osburn.)

Icterus nigerrimus, Osburn, Zoologist. 1859, p. 6662.

Neopsar nigerrimus, (Osburn,) Sclat. Cat Am. B. p. 139.

An entirely black species, apparently of frequent occurrence in the Island of Jamaica, from whence numerous specimens have been received at the Smithsonian Institution. Specimens in the Academy Museum, also from Jamaica. Structurally I cannot see that this bird is anything else than an *Agelaius*, and of the same subgroup as the preceding. It is more nearly related to the species immediately succeeding, which is also entirely black, from which, however, it can readily be distinguished on examination, by its being rather smaller, the bill more slender and the tarsi shorter, but the most reliable character is the different color of the plumage at the base of the feathers. In the present bird the feathers are dark ashy or nearly black at their base, and in the next (*A. cyanopus*,) they are light ashy, abruptly tipped with black. The female in this bird is stated to be black, in which respect it seems to differ from the succeeding.

11. AGELAIUS CYANOPUS, Vieillot.

Agelaius cyanopus, Vieill. Nouv. Dict. xxxiv. p. 552, (1819.)

This apparently little known species is in structure exceedingly like the species immediately preceding (*A. nigerrimus*=*Neopsar nigerrimus*) and the adult males, at least, of both being glossy black, the general resemblance also is very strong. In fact, I had always supposed the two to be identical until I had undertaken the present more extended examination, an impression which, though

I have never printed, I may have expressed verbally and epistolatorially, and beg now to correct, both for myself and others contingently interested.

The males only of the two species are alike in color, the female of the present species being strictly as described by M. D'Orbigny in Guerin's Magazine, Zool. 1838, p. 5, and previously by Azara and Vieillot; reddish chestnut, with longitudinal central stripes of black on the back and dullish yellow on the under parts of the body. In the Jamaica species (*A. nigerrimus*) both sexes are st ted to be black. The present bird is slightly the larger, with the bill rather the thicker and the tarsus longer, but the most decisive and reliable character is that in this species the entire plumage of the body above and below is *light ashy at the bases of the feathers*, easily seen in raising them, especially on the rump and lower part of the back. On those parts, in fact, the feathers are, almost throughout their length, light ashy, being only rather narrowly and abruptly tipped with deep black. In *A. nigerrimus* this is not the case, the feathers being, throughout, much darker and in fact nearly black, widely tipped with deep black. Both birds are strictly of the subgroup *Neopsar*.

This bird is accurately described by Azara, Apuntamientos, i. p. 313, (Walckenaer's French edition, iii. p.190) whose description is copied by Vieillot, Nouv. Dict. xxxiv. p. 552. It is also sufficiently described by D'Orbigny, Guerin's Magazine, Zool. 1838, Syn. Av. p. 5. The sexes, as given somewhat provisionally by these authors, are so labelled in the fine collection made by Mr. Christopher J. Wood, while attached to Capt. Page's Expedition, which surveyed the Rio La Plata and Rio Parana, which collection is now in the Museum of the Smithsonian Institution. The female, and probably the young male, are entirely different from the male in colors, in which respect this species apparently differs in a singular manner from its near relative, *Agelaius* or *Neopsar nigerrimus*, numerous specimens of which, labelled as both males and females, are in the collection of the Smithsonian Institution, and are entirely black. One of M. D'Orbigny's specimens in the Academy Museum is probably that of a young male, but differing only from the female in having the black stripes of the under parts more numerous and the throat less conspicuously mottled with black.

This species seems to be of rather wide diffusion, though apparently but indifferently known to naturalists. Specimens in Academy Museum, labelled "Bolivia," from M. D'Orbigny's collection, and others received from Mr. John G. Bell of New York, in "Bogota" collections. Specimens in Capt. Page's La Plata collection are labelled, undoubtedly correctly, by Mr. Wood, "Paraguay."

The points of distinction between the two closely allied species here mentioned, and especially the infallible character, as I regard it, to be found in the difference of the colors at the bases of the feathers, I am happy to acknowledge were first pointed out to me by Miss Grace Anna Lewis, most favorably known, and deservedly so, as a lecturer and teacher of Ornithology and General Natural History. Miss Lewis is one of several accomplished ladies who have most diligently studied in the Library and Museum of this Academy during the present winter, and not only successfully, but have contributed also in the highest degree to the general agreeableness of the similar pursuits of their fellow students of the stronger sex.

5. *Macroagelaius*.

12. AGELAIUS SUBALARIS, (Boissoneau.)

Quiscalus subalaris, Boiss. Rev. Zool. 1840, p. 70.

Specimens in the Academy Museum labelled "Bogota." Though usually rated as a *Quiscalus*, this bird, in my opinion, is more properly to be regarded as an *Agelaius*, though differing from the typical subgroups in having a longer and more *Quiscalus-like* tail. It is not an uncommon bird in collections from the northern countries of South America.

II.—Genus LEISTES, Swainson.

(Genus Leistes, Swains. Zool., Jour. ii., p. 191.)

1. *Leistes.*

1. LEISTIS MILITARIS, (Linnæus.)
   Emberiza militaris, Linn. Syst. Nat. i. p. 178, (1758.)
   Oriolus guianensis, Linn. Syst Nat. i. p. 162, (1766.)
   Oriolus americanus, Gm. Syst. Nat. i. p. 386, (1788.)
   Xanthornus rubricollis, Hahn, Voegel, pt. v. (1819.)
   Buff. Pl. Enl. 236, fig. 2. Edwards' Birds, pl. 82. Vieill. Gal. ii. pl. 88. Hahn, Voegel, pt. v., pl. 2.
   Numerous specimens of this well known species are in the Academy Museum, labelled as from Brazil and Guiana, and in the Museum Smithsonian Institution from Trinidad.

2. LEISTES SUPERCILIARIS (Bonaparte.)
   Trupialis superciliaris, Bonap., Consp. Av., i. p. 430, (1850.)
   Resembles the preceding, but rather larger and easily distinguished by its conspicuous superciliary stripe of white. Specimens in the Academy Museum, labelled Cayenne, and in Smithsonian Museum from Buenos Ayres, and Ceará, Northern Brazil.

2. *Gymnomystax.*

(Genus Gymnomystax, Reichenbach.)

3. LEISTES MELANICTERUS, (Vieillot.)
   Agelaius melanicterus, Vieill. Nouv. Dict. xxxiv. p. 544, (1819.)
   Icterus citrinus, Spix. Av. Bras. i. p. 69, (1824.)
   Psarocolius gymnops, Wagl., Syst. Av., p. (not paged, 1827.)
   Spix, Av. Bras., i. pl. 66.
   Specimens in Academy Museum from Cayenne and Brazil.

3. *Xanthosomus.*

(Genus Xanthosomus, Cabanis, Mus. Hein. i. p. 189.)

4. LEISTES ICTEROCEPHALUS, (Linnæus.)
   Oriolus icterocephalus, Linn. Syst. Nat. i. p. 163, (1766.)
   Edward's Birds, pl. 323. Hahn, Voegel. pt. v., pl. 6.
   Numerous specimens in Academy Museum, from Guiana and Trinidad.

5. LEISTES FLAVUS, (Gmelin.)
   Oriolus flavus, Gm. Syst. Nat. i. p. 389, (1788.)
   Psarocolius flaviceps, Wagler, Syst. Av., p. (not paged, 1827.)
   Chrysomus xanthopygius, Swains. Cab. Cy. p. 345, (1838.)
   Voy. Beagle, Birds pl. 45.
   Specimens in Academy Museum from Brazil and other countries of South America. This bird presents some variations in size, but nothing of specific value in the specimens under examination.

4. *Pseudoleistes.*

(Genus Pseudoleistes, Sclat. Cat. Am. Birds, p. 137.)

6. LEISTES VIRIDIS, (Gmelin.)
   Oriolus viridis, Gm. Syst. Nat. i. p. 395, (1788.)
   Agelaius Guirahuro, Vieill. Nouv. Dict. xxxiv., p. 545, (1819.)
   Leistes Suchii, Vigors, Zool. Jour. ii., p. 192, (1825.)
   Xanthornus Gasquetii, Quoy et Gaim. Voy. Uranie, Ois. p. 110, (1824.)
   Leistes Orioloides, Swains. Cab. Cy. p. 303, (1838.)
   Leistes brevirostris, Swains. Cab. Cy. p. 304.
   Zool. Jour. Supp. pl. 10. Voy. Uranie Ois. pl. 24. Pl. Enl. 236, fig. 1.
   Specimens from Brazil in Museum Academy. This species is nearly allied to the next succeeding, but seems to be larger, and has the under parts clear yellow.

7. LEISTES VIRESCENS, (Vieillot.)
Agelaius virescens, Vieill. Nouv. Dict. xxxiv., p. 543, (1819.)
Icterus anticus, Licht. Verz. Doubl. p. 19, (1823.)
Leistes tenuirostris, Swains. Cab. Cy. p. 304, (1838.)
"Oriolus Draco." Label in Massena collection.

Resembles the preceding, but is very probably quite distinct, being smaller, and has the bill more slender. In this species the yellow of the abdomen is restricted to a medial space, the sides being dark brownish olive, uniform with the upper parts of the body. Numerous specimens from Brazil in Academy Museum.

5. *Curaeus.*

(Genus Curaeus, Sclater, Cat. Am. Birds, p. 139.)

8. LEISTES CURAEUS, (Molina.)
Turdus curaeus, Mol. Sagg. Hist. Nat. Chili, 1782. (2d ed. p. 211, 1810.)
Sturnus aterrimus, Kittl. Mem. Acad. St. Petersb. 1834, p. 467.
Leistes niger, Swains. Cab. Cy. p. 304, (1838.)
Agelaius pustulatus, Swains. Cab. Cy. p. 303?
Gillis U. S. Exp. to Chili, Birds pl. 15. Kittl. Mem. Acad. St. Petersb. Voeg. pl. 2.

Specimens from Chili in the Academy Museum, and two specimens in the Massena collection labelled "St. Dominique," which if intended for the Island of St. Domingo or Hayti, is very probably erroneous. A large black species, with the feathers of the head rigid and pointed, well known as a bird of Chili and other countries of western South America. Resembles, especially in the pointed feathers of the head, *Agelaius chopi*, but is much larger. *Sturnus aterrimus*, Kittlitz, seems to be the young of this species.

III.—Genus DOLICHONYX, Swainson.

(Genus Dolichonyx, Swains. Zool. Jour. iii., p. 351.)

1. *Dolichonyx.*

1. DOLICHONYX ORYZIVORA, (Linnæus.)
Emberiza oryzivora, Linn. Syst. Nat. i. p. 311, (1766.)
Icterus agripennis, Bonap. Comp. List, p. 24, (1827.)
Psarocolius caudacutus, Wagl. Syst. Av. p. (not paged, 1827.)
Catesby Carolina, pl. 14. Edwards' Birds, pl. 291. Wils. Am. Orn. ii. pl. 12. Aud. B. of Am., pl. 54, Oct, ed. iv. pl. 211.

Numerous specimens in Academy Museum from various localities in Eastern North America, and two specimens labelled "Rio Negro." Specimens in Museum Smithsonian Institution from Cuba, Jamaica, and from Capt. Page's La Plata collection. The specimens from the "Rio Negro," in the Academy Museum seem to be rather large, but are not in adult plumage, and I find no reliable characters for distinction. Precisely similar specimens from the Rio Napo are in Mr. Lawrence's collection. This species is, assuredly, a great wanderer, but very probably the same in all localities on the continent of America.

2. *Agelaioides.*

2. DOLICHONYX BADIUS, (Vieillot.)
Agelaius badius, Vieill. Nouv. Dict. xxxiv. p. 535, (1819.)
Icterus fringillarius, Spix, Av. Bras, i. p. 68, (1824.)
Spix, Av. Bras. i. pl. 65.

Tail black, or brownish black. Quills red, tipped with brownish black. Lores black, which color extends slightly under and behind the eye; entire plumage of the head and body dark cinereous, with an olivaceous tinge on the top of the head and on the back, much lighter and generally with a tinge of dull yellow on the under parts. Primaries and secondaries bright reddish, with their tips brownish black, (easily seen on the under surface of the wing,) ter-

tiaries and greater coverts of the wing brownish black, widely tipped and edged with ferrugineous red. Bill black, feet brown. Sexes very similar, though the female is less tinged with gray on the head and back.

Total length about 8 inches, wing 3¾, tail 3¼ inches. Female smaller.

Hab.—Brazil, Paraguay, Buenos Ayres, Southern Brazil, exclusively?

Having before me two species which to some extent resemble each other, and both of which I suspect are known by the names cited above, I have given this short description of the bird, which is apparently that described by both Vieillot and Spix, and figured, rather unsuccessfully, by the latter. The present species seems to inhabit Southern and South-eastern Brazil, and adjacent countries, but the only authentic specimens to which I have access are in Capt. Page's collection, in Smithsonian Museum, and labelled "Buenos Ayres," which locality agrees sufficiently with those authors who have described this bird.

In this species the tail is black, usually with a tinge of brown, and much darker than the back, while in the species next described it is much lighter and exactly of the color sometimes called "hair brown," but little darker than the upper parts of the body. The quills are red on both webs for about two-thirds to three-fourths of their length, with the terminal one-third or one-fourth brownish black. The entire plumage is darker than in the species immediately succeeding. The description and figures of Spix, cited above, seem to be clearly from birds of this species, though perhaps not fully adult. Vieillot describes this species also. I do not regard it as possible that either this bird or the next succeeding is the young or female of any black species, as sometimes suspected by authors.

3. DOLICHONYX FUSCIPENNIS, nobis.

Tail light brown, quills light brown, primaries narrowly edged on their outer webs, secondaries and tertiaries widely edged on their outer webs, with bright ferrugineous red. Lores black, which color extends behind the eye, and becomes paler. Entire plumage of the head and body light reddish cinereous, with a tinge of grayish olivaceous on the upper parts, much lighter on the under parts, and strongly tinged with dull pale ochre yellowish. Greater coverts of the wings ferrugineous red, with paler edges, which is the color of the external edges of the wings, (but not of the quills, as in the preceding species.) Bill and feet brownish black.

Total length about 7 inches, wing 3¼, tail 3 inches. Female rather smaller.

Hab.—Ceará, N. E. Brazil. Specimens in Museum Smithsonian Institution, Washington.

The bird now described is clearly distinct from that immediately preceding, and is easily distinguished by its lighter and different colors generally, and especially by its light brown tail, and by its quills being light brown also, edged only with red. In the preceding the tail is black or brownish black, and the quills are red on both webs for more than two-thirds of their length, and brownish black at their ends or terminal one-fourth to one-third.

The only specimens that I have seen of this species are in the collection of the Smithsonian Institution, and are labelled as male and female, and are undoubtedly from Ceará, Northern Brazil. This bird and the immediately preceding *D. badius*, present some structural characters, which entitle them to be arranged with nearly equal propriety in either *Agelaius* or in *Dolichonyx*, but I think not in *Molothrus*.*

* DOLICHONYX MELANCHOLICUS, (Linnæus.)
Oriolus melancholicus, Linn. Syst. Nat. i. p. 180, (1758.)
Edwards' Birds, pl. 85.
Judging from the figure and description of Edwards, I suspect that this is a third species of the same subgroup of *Dolichonyx* as *D. badius* and *D. fuscipennis*, (above described,) and at present unknown to naturalists. It is peculiar in having not only the sides of the head, but the *throat* clear black, which is not the case in either of the others just mentioned, but otherwise it resembles them. It is stated by Edwards to be from the "Spanish West Indies," which now properly means those islands that *were* Spanish in 1743.

3. *Erythropsar.*

4. DOLICHONYX FRONTALIS, (Vieillot.)
Agelaius frontalis, Viell., Nouv. Dict., xxxiv. p. 545, (1819.)
Chrysomus et Xanthosomus frontalis, Auct.
Gray, Gen. Birds, i. pl. 86.

This is a well known and apparently abundant species of the northern countries of South America, briefly and by no means sufficiently described by Vieillot as above, but very accurately and handsomely figured by G. R. Gray in his great work, "The Genera of Birds." The locality given by Vieillot is Cayenne, and on that account, in a greater degree than on any peculiar applicability of his description, I am induced to conclude that this is the species entitled to the name as above given. The description is short, but, in my opinion, can safely be assumed as intended for this bird.

Head above to near the occiput, and neck before, reddish chestnut or bay color, which extends and widens on the breast. All other parts of the plumage glossy black. Lores and sides of the head black, which color is restricted to a very narrow line *over* the eye. Bill and feet black. Total length about 7 inches.

Hab.—Cayenne; Ceará, Northern Brazil.

Numerous specimens of this species are in the Acad. Mus. and in Mus. Smiths. Inst. It differs from that immediately succeeding (*D. ruficapillus,*) in having the red or bay colors on the head, neck and breast in front much more extended and of a different color, reddish chestnut in the present bird, dark chestnut in the next succeeding species. The two species are very nearly of the same size. Both are, in my opinion, most properly to be arranged as a subgroup of the genus *Dolichonyx.*

5. DOLICHONYX RUFICAPILLUS, (Vieillot.)
Agelaius ruficapillus, Vieill., Nouv. Dict., xxxiv. p. 536, (1819.)
Del Corona de canella, Azara, Apuntamientos, i. p. 315, (1802.)

This species is described as from Paraguay, by Azara, whose description is copied by Vieillot as above, and is, in my opinion, distinct from that immediately preceding (*D. frontalis,*) though usually regarded as the same. The only specimens that I have seen are in Capt. Page's La Plata collection now in the Mus. Smiths., and are from Paraguay.

In this species the head above and neck before are dark chestnut, and on both parts that color is more restricted than in the preceding, but especially on the neck in the present bird, in which it is narrower and does not extend to the breast. All other parts glossy black, on the sides of the head the black space is wider over the eye than in the preceding. In a young bird, also in Page's collection and from the same locality, Paraguay, the chestnut color of the neck in front is only beginning to appear, but is the same dark chestnut as in the adult, and quite different in shade from that of the preceding bird.

Although I regard the present and immediately preceding species as different, yet if they were the same, the name here given would be entitled to adoption, being the first given by Vieillot, though usually cited erroneously by authors. In nearly all late works, when the two names *A. frontalis* and *A. ruficapillus* are given, the pages cited in Nouv. Dict. are transposed.

IV.—Genus MOLOTHRUS, Swainson.

(Genus Molothrus, Swains., Faun. Bor. Am., ii. p. 277.)

1. *Molothrus.*

7. MOLOTHRUS PECORIS, (Gmelin.)
Oriolus ater, Bodd., Tab. Pl. Enl., p. 37, (1782.)
Oriolus fuscus et minor, Gm., Syst. Nat., i. pp. 393, 394, (1788.)
Fringilla pecoris, Gm., Syst. Nat., i. p. 910, (1788.)

Icterus Emberizoides, Daud., Traite d'Orn., ii. p. 350, (1800.)
Buff., Pl. Enl. 606. Wilson, Am. Orn., ii. pl. 18. Aud., B. of Am., pl. 99. Oct. ed., iv. pl. 212.

One of the most common birds of North America, migrating in the winter to Mexico, Central America and probably into the northern countries of South America. Specimens are in the Museum of the Philada. Acad. from Mexico, and others labelled Central America and South America. The first name for this species is that of Boddært as cited, who applies it to the bird figured by Buffon, as above.

Total length 7 to 7½ inches, wing 4¼ to 4½, tail 2¾ to 3 inches.

2. MOLOTHRUS OBSCURUS, (Gmelin.)
Sturnus obscurus, Gm., Syst. Nat, i. p. 804, (1788.)
Sturnus junceti, Lath., Ind. Orn., i. p. 326, (1790.)
Sturnus Novæ Hispaniæ, Briss. Orn., ii. p. 448.

Numerous specimens in the Smithsonian Museum, to which I ascribe this name, are from Mr. Xantus' collections at Colima and Manzanillo, Western Mexico, and from Mira Flores, Lower California. This species is distinct from the preceding, but much resembles it in colors and form also, having the same long wings and proportionate lengths of quills, the first quill being usually longest. It is smaller and has the bill much more slender; the wing is shorter and all other measurements less than those of the preceding well known species, except the tail, which is comparatively longer. In colors it is very nearly the same, but in form it is more slender and smaller, with the tail rather longer. One specimen from Lower California has the first quill shorter than the second, but otherwise is quite the same as those from Manzanillo.

Total length about 6½ to 6¾ inches, wing 4, tail 2¾ to 3 inches.

2. *Callothrus.*

3. MOLOTHRUS ÆNEUS, (Wagler.)
Psarocolius æneus, Wagl., Isis, 1829, p. 728.
Molothrus robustus, Cab., Mus. Hein, i. p. 193, (1851,) Jour. Orn., 1861, p. 81.

Specimens in the Smithsonian Museum from Yucatan, Costa Rica, and various parts of Mexico, and it is evidently an abundant species. Those from Mazatlan and Manzanillo seem to have the bill larger than others, and in some specimens this is so much the case as to suggest a doubt of specific identity.

This bird presents such very considerable changes in the shades and *lustres* of its plumage, that it might readily be mistaken for several species. The adult has the entire plumage of the head and body of the rich silky metallic yellowish-green, which characterizes the species, the upper and under tail coverts, wings and tail being lustrous green and blue. Singularly enough, in younger specimens the back and a large space on the abdomen are fine deep lustrous blue and violet, having so much the appearance of adult plumage, that series of specimens are necessary to determine their really intermediate character. Nearly all specimens brought in collections are of this intermediate description, and in a younger plumage there is a trace of blue, violet and purple lustre on nearly the entire plumage. The youngest in the large collection now under examination are dull brown, with a faint trace of greenish lustre on the wings and tail only, and of blue on the back. Forty-two specimens are now before me, twenty-four of which are from the Smithsonian collections, others are from the fine collection of my friend Mr. Lawrence, of New York, and in the Academy Museum. The Academy specimens are from Panama, (Mr. J. G. Bell's,) Nicaragua, Xalapa, Mazatlan, (Dr. Gambel's,) and various specimens received from Europe, labelled "Mexico."

4. MOLOTHRUS ARMENTI, Cabanis.
Molothrus Armenti, Cab., Mus. Hein., i. p. 192, (1851,) Jour. Orn., 1861, p. 82.

One specimen in adult plumage kindly lent to me for examination with other interesting birds of this group, by my friend Mr. Lawrence, of New York. Another specimen, which I suppose to be this species, is in quite young plumage, and was received at the Academy in a collection from Demarara. The latter appears to be younger than those described by Dr. Cabanis in Mus. Hein, as above.

This species can only be identified from Dr. Cabanis' note in Jour. Orn., 1861, p. 82, the previous descriptions by him being only applicable to young plumages. It resembles and is allied to the preceding, but is smaller, and the lustre of the head and body is quite different, being silky *yellowish brown*, not *green* as in *M. æneus*. This brown lustre is darker than in the head of *M. pecoris*, but if restricted to the head might readily suggest a comparison with that species, as is done by Dr. Cabanis in Mus. Hein., as above. It is a beautiful species.

Adult. Smaller than *M. æneus*, bill more slender, wing with the third quill slightly longest, first shorter, tail rather short. Entire plumage black, the head and body with a rich silky yellowish-brown lustre; upper and under tail coverts, wings and tail with rich purplish blue and green lustre, the blue prevailing on the tail coverts and shorter quills. Bill black, feet brownish black.

Total length about 7¼ inches, wing 4, tail 2¾ inches.

Hab.—Savanilla, New Grenada. Collection of Mr. George N. Lawrence, New York.

Young? Entire plumage dull brown, lighter on the under parts, and with a faint trace of green on the wings and tail, and blue on the back. First quill shorter than the third, and about equal to the fourth. Total length about 6 inches.

Hab.—Demarara. Mus. Acad., Philada.

Mr. Lawrence's specimen is the only adult of this species that I have seen, and, so far as I know, the only adult specimen known in any collection. It is a species with very fine rich lustre and perhaps the most handsome bird of this group.

3. *Cyanothrus.*

5. MOLOTHRUS BONARIENSIS, (Gmelin.)

Tanagra bonariensis, Gm., Syst. Nat., i. p. 898, (1788.)

Buff., Pl. Enl. 710. "Le Tangavio de Buenos Ayres," Buffon.

Specimens, undoubtedly of the bird figured and named as above, are in the Smithsonian Museum, from the same locality as that given by Buffon, (Buenos Ayres,) and are peculiarly valuable in the recognition of this species. They were obtained by the expedition under Capt. T. J. Page, U. S. Navy, which surveyed the Rivers La Plata and Parana, and are quite reliable in point of locality.

This bird is rather the smallest of four species nearly allied and resembling each other, which I am about to enumerate. My opinion is that there are at least this number of species of these nearly related birds, and I suspect that there are more of which I have only seen immature specimens.

Bill in adult, moderate or rather slender, with the upper mandible narrower than the under viewed laterally, and slightly curved; wing long, second quill longest; tail moderate or rather short, composed of wide feathers, slightly rounded at the end.

Plumage black, the entire upper and under parts of head and body having a uniform purple violet lustre, differing in shade in different specimens, but always uniform above and below. Shoulders also with purple lustre. Wings and tail with green lustre, not very brilliant, but easily distinguished; under tail coverts also with green lustre. In fine adult specimens there is a tinge of purple lustre on the wing coverts and on the shortest quills. Bill and feet black.

Total length about 8 inches, wing 4½ to 4¾, tail 3¼ inches.

Hab.—Southern and southeastern South America, Buenos Ayres, Rio Para-

na, Paraguay, Brazil. Spec. in Smithsonian Museum, Washington, and Acad. Mus., Philada.

About the size of, but scarcely recognizable from Buffon's figure. The species is, however, entirely respectable, and entitled, by all the laws of ornithological genealogy, to bear the name here given. A female or young male from Buenos Ayres, in Capt. Page's La Plata collection, is nearly uniform dark grayish fuscous, darker and nearly black on the back, and lighter on the under parts of the body. Quills and wing coverts edged very distinctly with pale gray, nearly white on the edges of the quills. Bill and feet black.

6. MOLOTHRUS DISCOLOR, (Vieillot.)

Passerina discolor, Vieill., Ency. Meth., iii. p. 939, (1823.)

Molothrus atronitens, Cab., Schomb. Guiana, iii. p. 682, (1848.)

Specimens from the Island of Trinidad, and one from Cuba, in the Academy Museum, seem to be the bird described by both the authors cited above. These specimens are undoubtedly authentic, the former having been collected under the direction of Mr. J. G. Bell, of New York, in Trinidad, and most kindly furnished by him for examination, and the specimen from Cuba, collected by the late Mr. R. C. Taylor of this Academy, in the northern part of that Island, (Port Gibara, province of Holguin.)

This bird is exceedingly like the preceding, though it is rather larger and has especially large legs and feet. The color and lustres are nearly the same, though the present bird seems always to have a large space on the lower abdomen, green, uniform with the under tail coverts. My opinion is that it is a distinct species, though requiring further investigation. I have never seen an authentic female specimen.

Resembling *M. bonariensis*, but larger. Bill rather long, upper mandible slightly curved, wing long, second quill longest, tail moderate, rounded, feet strong. Entire plumage black, the head and body above and below with an uniform purple violet lustre, except on the lower abdomen or ventral region and the under tail coverts, which have green lustre. Shoulders with purple lustre. Wings and tail with green lustre not very strong, but very similar to that of same parts in *M. bonariensis*.

Total length 8½ to 9 inches, wing 4¼ to 4½, tail 3½ inches.

Hab.—Trinidad, Cuba, Northern South America? Spec. in Mus. Acad., Philada.

Scarcely to be distinguished from *M. bonariensis*, but is larger in all its measurements, and especially in total length and in the bill and feet. Possibly to be regarded as a variety of the same species. This bird has not previously been noticed under any name, to my knowledge, from the island of Cuba.

7. MOLOTHRUS PURPURASCENS (Hahn).

Xanthornus purpurascens, Hahn, Voeg. As. Af., &c., pt. v. pl. 4, 1819.

Hahn, Voeg. As. Afr., &c., pt. v. pl. 4.

Specimens from Callao, Peru, collected by the late Dr. Gambel, others labelled as from Callao and Lima, and others labelled "Mexico" in Acad. Museum. This is a species about the size of the two preceding, but readily distinguished from them by its large strong bill, and the golden yellowish-purple lustre of the under parts of the body. It is a clearly distinct species, and appears to be the bird figured by Hahn, as above cited, whose figure is rather too short, but in form generally, and especially the thick strong bill, and the color of the upper parts, is a fair representation. The immature plumage is entirely different from that of either of the preceding.

Rather larger than *M. bonariensis*, and about the size of *M. discolor*, and easily distinguished by its *stronger bill* and the *golden purple lustre* of the plumage of the under parts of the body. Bill rather long, strong upper mandible slightly curved, wing long, with the *third* quill longest, tail moderate, not so much rounded as in the preceding species.

Entire plumage black, head above and upper parts of body with a violet

purple lustre, under parts with a rich *golden purple lustre*, most conspicuous on the breast and neck in front; under tail coverts with green lustre. Shoulders purple, wings and tail with green lustre.

Total length about 8 to 8½ inches, wing 4¼ to 4½, tail 3¼ to 3½ inches.

Young. General colors light yellowish and dull brown, much like young *Ploceï* or *Xanthorni*. Upper parts dull light brown, plumage edged with dull yellow, under parts pale dull yellow, with longitudinal stripes of pale brown. Bill very strong.

Hab.—Western South America, Peru, Mexico? Spec. in Mus. Acad., Philadelphia. Probably peculiar to the countries of Western South America, and an entirely respectable species.

8. MOLOTHRUS SERICEUS (Swainson).

Scolecophagus sericeus, Swains. Cat. Cy., p. 301, (1838).

Molothrus brevirostris, Swains. Cat. Cy., p. 305, (1838)?

Icterus sericeus, Licht. Verz. Doubl., p. 19, (1823)?

Specimens from Bahia, from which locality this bird is commonly brought, and is apparently the common species of Eastern South America. Rather larger than, but difficult to distinguish from, the species immediately preceding, (*M. purpurascens*,) and has the same golden purple lustre on the plumage of the under parts of the body. The bill is straighter, and not so strong, and the second and third quills nearly equal.

Though commonly brought from Bahia in collections, I have not a sufficient number of specimens in adult plumage for a satisfactory examination of this bird, though I am inclined to the opinion that it is not quite identical with either of the preceding. Specimens that I regard as *M. brevirostris* appear to me to be the same as others also from Bahia, which I regard as *M. sericeus*, probably differing only in age. This seems to be rather the largest species of this group, though, perhaps, little larger than *M. æneus* or *M. purpurascens*, and, though my opinion is favorable, I am under the necessity of regarding it as a species of but imperfect respectability. It is certainly, I think, the bird described by Swainson, as above, and probably also by Lichtenstein under the same name.

4. *Cyrtotes.*

(Genus Cyrtotes, Reichenbach.)

9. MOLOTHRUS MAXILLARIS, (D'Orbigny et Lafresnaye).

Icterus maxillaris, D'Orb. et Lafres. Mag. Zool., 1838, p. 6.

D'Orb. Voy. Am. Mer. Ois., pl. 52, fig. 3.

Two specimens from M. D'Orbigny's collection are in the Academy Museum. This curious bird, in color and general characters, intimately resembles the last four species above given, but also much resembles the birds of the group *Lampropsar*. Of the species here given as *Molothri*, it approaches most closely *M. bonariensis* and *M. discolor*, and has the *lustres* of the plumage very similar, but is larger than either, and, in fact, is rather larger and with longer wings than either of the preceding species in this memoir. It is, in my judgment, entirely a peculiar bird, and described, entirely judiciously, by the distinguished authors above cited as a distinct species.

The peculiar character of this bird is the singular lobe on the cutting edge of the upper mandible, as stated by M. D'Orbigny, near the point, and which, if met with in a single specimen, might readily be suspected of being a deformity, as intimated by the greatest of European Ornithologists now living: "*rostro deformi?*" This suspicion and general view of the case is, however, to me rendered less cogent by the fact that I have before me *two* of M. D'Orbigny's specimens, and they are like each other with much exactness! In both the adult specimens, this curious lobe is more strongly developed than as represented in M. D'Orbigny's figure above cited.

This bird is accurately described by M. D'Orbigny, as above cited, and also

in Voy. Am. Mer. Ois., p. 367. It is with doubt that I arrange this bird as representing a subgroup, and am not without a suspicion that it is more properly to be placed in the group *Lampropsar*. The only specimens that I have seen are those of M. D'Orbigny, above alluded to, and this species seems to be little known to naturalists.

5. *Lampropsar.*

(Genus Lampropsar, Cabanis, Schombg. Guiana, iii. p. 682.)

10. MOLOTHRUS TANAGRINUS, (Spix).

Icterus tanagrinus, Spix, Av. Bras., i. p. 67, (1824).

Icterus violaceus, De Wied, Beitr. Naturg: Bras., iii. p. 1212, (1831).

Spix, Av. Bras., i. pl. 64, fig. 1.

Total length about 7½ inches, wing 4, tail 3 to 3½ inches. Entire plumage black, with a nearly uniform purplish blue lustre on the head and body, above and below, wings and tail with a green lustre. Bill and feet black.

The smallest of several species of this genus, and brought abundantly in collections from Brazil. In the various specimens now before me, this bird presents a uniform purplish blue lustre, by which it can be easily distinguished from either of the two species immediately succeeding. It has not quite the fine purple and violet lustre of either of them. Numerous specimens in the Academy Museum.

11. MOLOTHRUS GUIANENSIS, (Cabanis).

Lampropsar guianensis, Cab. Schombg. Guiana, iii. p. 682, (1848).

Total length about 8 inches, wing 3¾ to 4, tail 3½ inches. Rather larger than the preceding, with the wing rather shorter, comparatively, and third quill slightly longest. In the specimens before me, this species is easily distinguished from the preceding by the violet purple lustre of the head and of the upper and under parts of the body. Wings and tail with greenish lustre, darker than in the preceding. In colors, this species resembles the next succeeding, though scarcely more than half the size. It appears to be from Northern South America.

Specimens of this species are in the Academy Museum, and in the collection of that distinguished and excellent Ornithologist, Mr. George N. Lawrence, of New York.

12. MOLOTHRUS CABANISII, nobis.

Lampropsar dives, Cab. Mus. Hein., p. 194? (nec Bonap.)

Total length about 10 inches, wing 5 to 5½, tail 4½ inches, bill strong, though of the same general form as in both the preceding. Entire plumage black, head and body, above and below, with a fine violet purple lustre, and having a golden tinge on the under parts. Wings and tail with a dark green lustre, bill and feet black, claws rather long and slender, but very sharp.

Easily distinguished from the two preceding species by its much larger size, and, in the specimens now at my disposal, the plumage is the most lustrous, the golden violet purple in the present bird being especially a distinguishable feature. I am not confident that this is the bird alluded to by Dr. Cabanis as *Lampropsar dives*, as above cited, but regard it as probable. It is smaller than, and generically distinct from the bird which seems to be *L. dives*, Bonap. Comp. Av. i. p. 425, now well known as a bird of Mexico and Central America, (and which I regard as the same as *Quiscalus sumichrasti*, De Saussure).

One specimen in the Acad. Mus. is from Guiana, and another in the collection of my friend Mr. Lawrence, is from Santa Martha, New Grenada; others in Acad. Mus. are without indication of locality, though the species is singularly uniform in characters in all the specimens now under examination. To this handsome species I have taken the liberty of applying the name of my excellent friend and correspondent, Dr. Cabanis, of Berlin, not so much

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because I suspect that this is the bird alluded to by him, as to avail myself of an opportunity to express my high appreciation of his great merits and acquirements as an Ornithologist.

13. MOLOTHRUS RUFO-AXILLARIS, nobis.

With a part of the axillary feathers clear reddish chestnut color.

Entire plumage black, head and body, above and below, with a bluish purple lustre, wings and tail with an obscure greenish lustre or nearly plain black. Bill and feet black.

Total length about 8¼ inches, wing 4½, tail 3½ inches.

Hab.—Buenos Ayres. Spec. in Smithsonian Mus., Washington.

One specimen only of this curious bird is in the Museum of the Smithsonian Institution, and seems clearly to belong to this group, though not presenting such highly lustrous plumage as either of the preceding. It is apparently quite adult, and easily recognised by the reddish chestnut-colored axillary feathers, to be seen at once by raising the wing at the shoulder.

Though having all the characters of an adult bird, the plumage in this specimen has but slight lustre, inclining to bluish purple on the head and body, and greenish on the wings and tail. The only specimen that I have seen is in the fine collection made by Mr. Christopher J. Wood, while attached to Capt. T. J. Page's La Plata Expedition, which is now in the Museum of the Smithsonian Institution.*

V.—Genus STURNELLA, Vieillot.

(Genus Sturnella, Vieill. Analyse p. 34.)

1. *Sturnella.*

1. STURNELLA LUDOVICIANA, (Linnæus.)

Sturnus ludovicianus, Linn. Syst. Nat. i. p. 290, (1766.)
Alauda magna, Linn. Syst. Nat. i. p. 167, (1758.)
Cacicus alaudarius, Daud. Tr. D'Orn. ii. p. 325, (1800.)
Sturnella collaris, Vieill. Nouv. Dict. xxxii. p. 203, (1819.)

Catesby, Carolina, pl. 33. Buff. pl. Enl. 256. Vieill. Gal. Ois. ii. pl. 90. Wilson Am. Orn. iii. pl. 191. Aud. B. of Am. pl. 136. Oct. ed. iv. pl. 223.

An abundant bird of Eastern North America, carefully described by the authors cited above, and by Prof. Baird in Birds of N. A. p. 535, and accurately figured as above given. The specific name "*magna*," has undoubted priority for this species, and I only object to it and do not use it at present on account of its singular inappropriateness to this bird as a species of the genus *Sturnella* or Little Stare. *Sturnella magna*, or *Great Little Stare*, strikes me as approaching absurdity, if that is possible, or any fault in ornithological nomenclature! I will in no wise molest scientific persons whose tastes may be different in this matter, however, and so promise.

This bird is nearly related to all of the next four species of this genus, equally in structure and in colors, and it would be difficult to describe by positive characters either species of this group, so as to insure recognition absolutely, or without comparative characters being given. All the species can be identified from the excellent descriptions in Ibis, 1861, p. 179, by Dr. Sclater of London, and the best descriptions of the two species of the United States are by Prof. Baird in Birds of N. A. p. 535. No other genus or subgenus of this family presents so many species of such uniformity of structure and similarity of colors, and there are, assuredly, few such in the entire kingdom of birds.

2. STURNELLA NEGLECTA, Audubon.

Sturnella neglecta, Aud. B. of Am. Oct. ed. vii. p. 339, (1844.)
Aud. B. of Am. Oct. ed. vii. pl. 489.

An abundant bird of Western and Central North America. Generally paler

* Lampropsar Warczewiczi, Cab. Jour. Orn., 1861, p. 83, may be another species of this group.

colored than the preceding, and with the transverse markings of the upper parts narrower, and, as pointed out by Prof. Baird, (B. of N. A. p. 538), the yellow of the throat seems generally to extend around under the eye and at the base of the under mandible in this bird more than in *S. ludoviciana*. The two species are about the same size.

Numerous specimens in the Academy Museum and in the Museum Smithsonian Institution. In the central regions of North America it is possible that a hybrid race between the two species may be produced, to be referred with about equal propriety to either. Usually, and having some degree of experience with these two species, it is not difficult to distinguish them at sight, though such consummation to be surely brought about, would require elaborate descriptions in words.

3. STURNELLA HIPPOCREPIS, Wagler.

Sturnella hippocrepis, Wagl. Isis, 1832, p. 281.

Smaller than either of the preceding, and having the pectoral black collar much more narrow. This species is very nearly related to the next succeeding (*S. mexicana*,) and can scarcely be distinguished from it by any characters which seem to be reliable. It is, however, in my opinion, clearly distinct from *S. ludoviciana* and *S. neglecta*, and all the characters are present in the specimens before me, which are stated with his usual great clearness and accuracy by Mr. Lawrence, in an interesting memoir on the birds of Cuba, in Annals N. Y. Lyceum, vii. p. 266. In the present species the tertiaries are nearly or quite equal in length to the primaries, while in *S. ludovicianus* they are much shorter, which character is especially stated by Mr. Lawrence and seems to be quite correct.

Numerous specimens from Cuba are in the Museum Smithsonian Institution, and this bird seems to be peculiar to that island. The peculiarities pointed out by Mr. Lawrence stand good in all specimens of this bird now under examination.

4. STURNELLA MEXICANA Sclater.

Sturnella mexicana, Sclat. Ibis, 1861, p. 79.

Very nearly related to the preceding, (*S. hippocrepis*,) if distinct, and I give it, at present, as a species provisionally only. Smaller than *S. ludoviciana* and *S. neglecta*, but perhaps rather more closely resembling the latter in colors. Pectoral black collar narrow. The colors of the upper parts seem to be less clearly defined, and of a slightly different style and pattern from the preceding, and it may bear about the same relation to that species (*S. hippocrepis*) that *S. neglecta* does to *S. ludoviciana*. Such relation I hold to be rather probable from the specimens now at hand.

Specimens from Mexico in Academy Museum, and in Museum Smithsonian Institution from Mexico and Guatemala.

5. STURNELLA MERIDIONALIS, Sclater.

Sturnella meridionalis, Sclat. Ibis, 1861, p. 79.

Quite distinct, in my opinion, from either of the preceding. Fully as large, apparently, as *S. ludoviciana*, with the tarsus slightly longer, and larger toes and claws, bill longer and more pointed. Black pectoral collar narrow as in *S. hippocrepis* and *S. mexicana*, but with tertiaries short as in *S. ludoviciana*.

One specimen from Brazil, in Museum Smithsonian, and others of doubtful locality, but South American, in Museum Academy. This species seems to be the peculiar South American form, and is apparently rather the largest bird of this closely allied group. Its characters are carefully and accurately stated by Dr. Sclater of London, as above cited, though the species seems to be little known to ornithologists.

2. *Trupialis.*

(Genus Trupialis, Bonap. Consp. Av. i. p. 429.)

6. STURNELLA MILITARIS, (Linnæus.)

Sturnus militaris, Linn. Mant. p. 527, (1771.)

Well known as a bird of Chili and other countries of Western South America. In this species the under wing coverts are white, and the fine scarlet of the throat and breast extends over the abdomen.

Numerous specimens in the Academy Museum, and in Museum Smithsonian Institution.

7. STURNELLA LOYCA, (Molina.)
Sturnus loyca, Mol., Dizz. Stor. Nat. Chili, (1782,) 2d ed. p. 212, (1810.)
Sturnella bellicosa, De Filippi.
Pezites brevirostris, Cab., Mus. Hein., p. 191, (1850.)
Leistes albipes, Philip. et Landb. Trosch. Archiv., 1863, p. 128?

This is apparently a smaller bird than the preceding, with a shorter and thicker bill, and the scarlet of the under parts is restricted to the throat, neck and breast, not extending on the abdomen as in the preceding. One fine apparently adult specimen now before me has the *tibiæ* clear white on their inner surfaces, mottled with black on their outer, in which plumage it seems to be *Leistes albipes*, Philip. et Landb., as above cited. The under wing coverts are white, as in the preceding.

The synonymy of this species I find to be difficult, but it is not improbable that it was first described by Dr. Cabanis as above cited, authors to the contrary notwithstanding. Specimens in Mus. Acad.

8. STURNELLA DE FILIPPII, (Bonaparte.)
Trupialis defilippii, Bonap. Consp. Av. i. p. 429 (1850.)

Easily distinguished from either of the two preceding by its black under wing coverts. Specimens from Brazil in Museum Academy.

3. *Amblyramphus.*

(Genus Amblyramphus, Leach, Zool. Misc. p. 81, 1815.)

9. STURNELLA HOLOSERICEA, (Scopoli.)
Xanthornus holosericeus, Scop. Flor. et Faun. Insub. p. 88, (1786.)
Oriolus ruber, Gm. Syst. Nat. i. p. 388, (1788.)
Amblyramphus bicolor, Leach, Zool. Misc. i. p. 82, (1815.)
Sturnus pyrrhocephalus, Licht. Verz. Doubl. p. 18, (1823.)
Sturnella rubra, Vieill. Ency. Meth. ii. p. 635, (1823.)
Leistes erythrocephalus, Swains. Cab. Cy. Birds, ii. p. 275, (1837.)
Leach. Zool. Misc., i. pl. 36.

Numerous specimens of this apparently common species are in the Academy Museum from Brazil. Easily recognized when adult, by its brilliant scarlet head, and tibiæ and black body. The young is nearly uniform dull black, the scarlet generally first appearing on the throat and forehead.

This species ends the subfamily *Agelaiinæ*, but I am not quite confident that the genera or subgenera *Creadion*, Vieillot, and *Amblycercus*, Cabanis, do not belong here. Such may be the case also with *Hypopyrrhus*, Bonaparte. At present, however, my impression is, that all of these have greater affinities in other groups of the family *Icteridæ*.

A Critical Review of the Family PROCELLARIIDÆ:—Part III; embracing the FULMAREÆ.

BY ELLIOTT COUES, A. M., M. D.

[Continued directly from page 144 of these Proceedings for 1864.*]

The *Fulmareæ*, as I would define them, form a group of the *Procellarinæ* represented as far as is now known by only three genera. These are *Fulmarus*, *Thalassœica and Ossifraga*; all closely allied in general form and propor-

* The writer's protracted residence in Arizona, where books and specimens were alike unattainable, has unavoidably delayed until now the continuation of the series of papers begun in 1864. Efforts will now be made to finish the subject.

tions, though presenting considerable diversity in coloration. The genus *Adamastor* which has been placed among the Fulmars by Bonaparte, seems, as I have attempted to show in a previous paper,* to fall most naturally among the *Puffineæ;* being not widely separable from *Majaqueus*, which Bonaparte himself (Consp. Av. ii. p. 200) places among the Shearwaters. The position of the somewhat anomalous genus *Daption* is a little uncertain; possessing, as it does, some of the characteristics of the present group. I am of opinion, however, that it is most naturally to be included with the *Æstrelateæ*, under which section I shall hereafter consider it.

The section *Fulmareæ* then, as thus constituted, is composed of large or moderate sized species, having a form very stout, compact, and robust, and being nearly always very light colored. It is apparently the section of Petrels most closely allied to the *Laridæ*, and forming the connecting link between the two families. Particularly in the genus *Thalassoica* is the Laridine aspect very marked.

The bill is always large and robust. The unguis of the upper mandible is strong, very convex in profile, and much hooked at the extremity. That of the lower mandible is never much attenuated nor decurved, with the outline of the gonys decidedly concave; but is short, stout, obtuse, with a straight ascending gonys. The nasal tubes are prominent, wide, long, vertically truncated, usually emarginated at their end; the nasal septum very thin and delicate. The wings are of moderate length, reaching when folded about to the end of the tail; the primaries are very broad. The tail is short; more or less rounded; of 14 to 16 feathers, all of which are broad and subtruncated at their extremities. The feet are comparatively small and weak. The tarsus is slender, compressed, reticulated, shorter than the middle toe. The outer toe is as long or longer than the middle one. The tip of the inner claw about reaches to the base of the middle.

Of the three genera which I regard as the components of this section, *Ossifraga* has 16 rectrices, while *Fulmarus and Thalassoica* have but 14. Of *Fulmarus* we at present know three species; of *Thalassoica*, two; while *Ossifraga* has but a single representative. The section is cosmopolitan.

FULMARUS Leach.

Procellaria sp., Auctorum; nec Linn.

Fulmarus, Leach, Stephen's Gen. Zool. 1825, xiii. p. 233. Type *Proc. glacialis* L.

Rhantistes, Kaup, Sk. Ent. Eur. Thierw. 1829, p. 37. Same type.

Gen. Char. Bill about two-thirds as long as the head, three-fourths as long as the tarsus; short, very stout, exceedingly robust at the base, where it is higher than broad; the lateral laminæ of the upper mandible especially large, and swollen; the unguis short, very stout, convex in outline, commencing to rise almost from the nostrils; commissure greatly curved; the outline of inferior mandibular rami a little concave; the gonys ascending; the sulci of both mandibles deep and distinct; the nasal tubes long, nearly half the culmen, prominent, inflated, their dorsal outline about straight, their apex emarginate, vertically truncated; the nasal septum very thin. Wings of moderate length; reaching when folded about to end of tail; the primaries very broad at their bases, somewhat rapidly tapering to their rounded tips. Second primary nearly as long as the first. Tail of 14 rectrices, all broad, subtruncated; the lateral ones somewhat graduated. Feet rather small and weak; the tibiæ exposed for a short distance; the tarsi slender, moderately compressed, about three fourths as long as the middle toe and claw. Outer toe and claw about equal to middle toe and claw; the toe alone longer than the middle without its claw. Inner toe very short, the tip of its claw barely reaching to the base of the middle claw. Hallux short, only observable as a stout obtuse subconical claw.

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* *Vide* Pr. A. N. S. Ph. for April, 1864, p. 117.

Large in size, and very robust in form. Colors white and light pearl blue, with darker primaries.

As above defined, the genus *Fulmarus* is restricted to its type *glacialis*, and the two other closely allied species *pacificus* and *Rodgersii*.

As is the case with all the genera of the family, the name *Procellaria* has been applied to the present genus. As I have already indicated,* I consider *P. pelagica* and its congeners as typical of the genus *Procellaria*. *Fulmarus* appears to be the first distinctive appellation of the present group; having priority over *Rhantistes* of Kaup.

The type of this genus is subject to variations in size, etc., remarkable even in this variable family. In consequence, several races or varieties have been described and named; which I think are properly to be included under *glacialis*. I recognize as valid the three following species.

FULMARUS GLACIALIS (Linn.) Steph.

Procellaria glacialis, Linn., S. N. 1766, p. 213; et auct. nec Pall., nec Forst.
Fulmarus glacialis, Stephens, Gen. Zool. 1826, xiii. p. 234, pl. 27. Bonaparte, Consp. Av. ii. 1856, p. 187; et al. auct. recent.
Fulmarus glacialis, var. *Audubonii*, Bonaparte, Consp. Av. 1856, ii. p. 187.
Fulmarus glacialis var. *minor*, Bonaparte, Consp. Av. 1856, ii. p. 187.
"*Procellaria minor*, Kjærb," fide Bp.
"*Procellaria hyemalis*," Brehm.

Habitat. North Atlantic Ocean.

This species has served as the basis of so many nominal species, caused by its great variations, that, although no description of it is needed, it may be well to notice the differences to be found whenever large series are compared.

Examination of numerous specimens convinces me that the differences in *color* are those of age and season chiefly if not wholly; since the species passes very gradually from the uniform dull greyish brown of youth to the pure white and pearly blue of the adult condition. There do not seem to be any very well defined stages during this transition. Birds of the year, before the autumnal moult, are entirely fuliginous gray, lighter beneath, with darker margins to the feathers of the back and wing coverts. The tail is about concolor with the rest of the plumage. There is an angular anteocular black spot. The bill and feet are of a dull yellowish or ashy brown. After the moult, the pearly blue of the back extends upon the nape and head; (just as it does in *Rissa tridactyla*;) and the upper tail coverts, and the rectrices are of the same color. The primaries are colored the same as in the mature bird. Spring and summer adults have the pearl blue restricted to the back and wing coverts; other parts of the body being pure white. The distribution of colors is then just as in *Larus canus*, *argentatus*, etc. The dark anteocular spot however seems permanent. The bill is wholly yellow; the feet yellow with a bluish tint.

The variations in *size* are carefully to be noted; since, taken in connection with a varying length and robustness of bill, they have given rise to nominal species. The average length appears to be about 16·5 inches; there is however a margin of one or even two inches both above and below this standard to be allowed. The wing measures from the carpal joint to the tip of the longest primary, from rather less than 11 to 12·5 inches. The average length of the bill (chord of the culmen) is 1·5; but it may be 1·33 or 1·66, with a corresponding difference in robustness. Young birds are always weak-billed. The tail ranges from about 4 to about 5 inches. The average of the tarsus is about 2 inches: of the middle toe without its claw, 2·25; both varying to the extent of a fourth of an inch or rather more. The feet however as a general rule differ less in dimensions than other parts.

The synonomy of this species is very brief and uninvolved; the points re-

* Proc. A. N. S. Philad'a. March, 1864, p. 79.

quiring considerations being hardly more than those relating to the varieties or supposed species which have been separated from it.

I have before me a rather small and weak-billed specimen from Greenland, which appears to be an example of what was called *P. minor* by Kjærb, or *P. glacialis* var. *minor* by Bonaparte. It has no claim that I can discover to be considered as even a variety; as the difference in size from the ordinary standard is by no means unusual. In the var. *Audubonii* of Bonaparte—based upon the bird used for the figures in Audubon's works—there is exhibited a by no means unusual variation in size, or in strength of bill.

While I would thus consider the Atlantic Fulmars as representing but a single species, nothing that I have found in an extensive series tends to invalidate the claims of *F. pacificus* to specific distinction.

FULMARUS PACIFICUS (Aud.) Lawr.

Procellaria glacialis, Pallas, Zoog. Rosso-As. ii., 1811, p 312.. Sed non Linn. nec auct.

Procellaria pacifica, Audubon, Orn. Biog. v. p. 331. Id Bds. N. Amer. vii. 1844, p. 208.

Procellaria (*Fulmarus*) *pacifica*, Lawrence in Baird's B. N. A. 1858, p. 826.

Fulmarus glacialis var. *pacificus*, Bonaparte, Consp. Av. ii. 1856, p. 187.

? *Procellaria glacialis* (*juniores*), Kuhl, Beit. Zool., 1823, p. 141.

This species, though very closely allied to *glacialis*, and requiring a rather careful comparison to distinguish it, yet appears to differ by constant characters. It is nearly or quite as large as that species; but the feet are, perhaps, a little shorter and weaker. There seems to be a constant difference in the shape of the bill; which, though not much shorter, is considerably weaker, more compressed, and more attenuated and decurved at the tip. The inferior mandibular rami divaricate at a more acute angle. But I have not been able, in examining quite a large series, among which is one of Audubon's types, to find any distinctive characters in the nasal tubes; the dorsal outline of which does not appear to be straighter than that of the Atlantic bird. In fact, one example of *pacificus* has a more concave tube than one of *glacialis*, now before me; nor can I discover that the carination of the tubes is more marked in one species than in the other. One example of *pacificus* shows no trace of any carination.

Some features of coloration are, perhaps, most distinctive of this species. The upper parts are much darker in *pacificus* than in *glacialis*; inclining to a bluish cinereous rather than a pearly blue. The rump and upper tail coverts, in lieu of being nearly pure white, are concolor with the middle of the back, or even darker than it. The bend of the wing, and the secondaries and tertials are somewhat deeper-colored than those of *glacialis*. The bill is bright yellow, lightest on the unguis: the root of which latter is bluish horn-colored. The feet are bright yellow, only slightly obscured on the outer aspect of the tarsus, and on the outer toe. The anteocular spot is smaller and more indistinctly marked than in *glacialis*.

Young birds have the yellow of the bill obscured by brownish or greenish, the unguis especially being quite dark, as are also the feet and toes. The entire plumage is fuliginous grayish brown; deepest on the side of the head; lighter on the under parts of the body, where there is considerable of a smoky cinereous tint. Most of the feathers of the upper parts have cinereous or pearly tips. Some of the tertials are more or less distinctly tipped with grayish white. The remiges and rectrices are brownish black; the former lightest, inclining towards their tips to grayish. The primary shafts are light brown, deepening in color at their apices. The under surfaces of the primaries are cinereous gray.

I thus detail the differences I have been able to find between the two supposed species, considering them as sufficient to establish a species; though

with equal reason they might be held as indicative of the extreme of variation of a single changeable type, and thus forming only a local race or geographical variety.

The *Procellaria glacialis* of Pallas in all probabilty refers to this species rather than to the true *glacialis* of Linnæus. I also think that the "*Procellaria glacialis*, juniores ex Americâ Septentrionali allatæ, colore cinerascenti-fuliginoso tinctæ" of Kuhl's "Beitrage," p. 141, belongs here rather than to the *Thalassoica glacialoides* to which Dr. Schlegel has referred it.

Fulmarus Rodgersii Cassin.

Fulmarus Rodgersii, Cassin, Cat. Birds North Pacif. U. S. Expl. Exped., in Pr. A. N. S. Ph. 1862, p. 290.

Habitat.—North Pacific Ocean.

I have before me Mr. Cassin's original and type specimen. With exactly the size and very nearly the form of *F. glacialis*, it differs from the latter very decidedly in color, as will be seen by the following comparative description:

The bill is bright yellow, except the base of the unguis of the upper mandible, which is bluish black. The middle of the back, the scapular feathers and some of the lesser wing coverts are a rather dark grayish ash, approaching the hue that is most distinctive of *pacificus*. The rump and upper tail coverts are pure white. The rectrices are fuliginous grayish ash; their inner webs and their extreme apices whitish, their shafts wholly yellowish. The whole of the tertials and the greater wing coverts are pure white; the lesser wing coverts and edge of the wing of the same color, but marbled with the ashy hue of the back. The secondaries are white with yellow shafts; the terminal half of their outer webs grayish brown. The primaries are dull brownish black, their entire shafts yellow, their inner webs to within an inch of their tips white. These markings of the primaries are much like those of *Thalassoica glacialoides*. All the rest of the body is white. The legs and feet are bright yellow; the outer aspect of the tarsus, and the outer toe somewhat obscured by dusky. The nails are ochraceous brown.

Bill along chord of culmen 1·50 inches and hundredths; from feathers on side of lower mandible to its apex 1·40; nasal tubes ·60; height of bill at base ·80; width about the same; wing from the carpus 12·25; tail 5·50; exterior rectrices ·75 shorter; tarsus 2·00; middle toe and claw 2·60; inner do. 2·20.

Some differences in the shape of the bill of this species are readily recognizable. It is even stouter than that of *glacialis*, being at the base fully as wide as high; and the lateral laminæ of the upper mandible is bulging and convex rather than straight. The nasal tubes are larger, broader, more depressed, with no traces of median longitudinal carination. Independently of these discrepancies, it is to be distinguished from *glacialis* by the restriction in extent and deep hue of the color of the back; by the white tertials and coverts, dark rectrices, yellow primary shafts, amount of white on inner webs of primaries, etc.

But a single specimen is known to exist in any collection. No. 21304 of the Smithsonian Register. From the North Pacific, the precise locality not known.

THALASSOICA Reich.

Procellaria sp. auctorum.
Thalassoica, Reichenbach, Syst. Av. Type *P. glacialoides*, Smith.
Priocella, Homb. et Jacq. Same type; fide G. R. Gray.

Gen. char. Bill slightly shorter than the head, or tarsus, about three-fifths the middle toe and claw; higher than broad at the base, compressed, not very robust, its sides regularly tapering to the rather thin tip. Unguis attenuated and only moderately hooked; commissure a little curved, outline of inferior mandibular rami, and of gonys, both slightly concave. Nasal

tubes two-fifths as long as the culmen, basally wide and depressed, terminally high and compressed. Feet rather small; tarsus much compressed, as long as the inner toe without the claw; about three-fifths the middle toe. Wings and tail as in *Fulmarus*.

This genus differs from *Fulmarus* in little except the bill; in which, however, the distinction is well marked. The bill has, notwithstanding the presence of the nasal tubes, an aspect which is Laridine to a degree not found in any other genus of the family; and the pattern of coloration in the type of the genus is almost precisely that of a *Larus*.

Two species are known to compose the genus. Intimately allied in form, their colors are more widely diverse than is usually found to be the case in congeners of this family.

THALASSOICA GLACIALOIDES (Smith) Reich.

Procellaria glacialis, Forster, Descr. Anim. ed. Licht. 1844, p. 25, No. 21. Nec Linn., nec auct. al.

Procellaria glacialis, Var. B., Gm. S. N. i. 1788, p. 563. Lath. Ind. Orn. ii. 1760, p. 823.

Procellaria glacialoides, Smith, Illust. S. Afric. Bds. t. 51.

Thalassoica glacialoides, Reich. Syst. Av. Bonaparte Consp. Av. 1856, ii. p. 192.

Thalassoica glacialoides var. *polaris*, Bp. Consp. Av. 1856, ii., p. 192.

Thalassoica glacialoides var. *tenuirostris*. Bonaparte, Consp. Av. 1856, ii. p. 192.

Procellaria tenuirostris, Audubon, Orn. Biog., 1839, v., p. 333. Id. Birds North Amer. vii. 1844, p. 210, (fig. nulla.) Lawrence, in Baird's B. N. A., 1858, p. 826.

Procellaria Smithi, Schlegel, Monog. *Proc.* Mus. Pays Bas, 1863, p. 22.

Priocella Garnoti, Homb. et Jacq. Voy. Pole Sud, pl. 32, fig. 43; fide G. R. Gray.

Habitat.—Southern hemisphere generally, apparently replacing the *F. glacialis*. Columbia River and whole Pacific Coast of North and South America. Cape Horn. Cape of Good Hope. Atlantic and Pacific coasts of Africa. Not in the North Atlantic?

The sulci on the sides of the bill, uniting the lateral laminæ with the unguis, are remarkably narrow, shallow, and indistinct; and the bill in other respects calls forcibly to mind that of a small *Larus argentatus*. The colors of the back, and of the primaries even to the white spaces on their inner webs, and the size and shape of the feet and tail are rather those of a Laridine than a Procellaridine bird.

Nasal tubes a third the length of the culmen, basally broad and depressed: terminally narrower and elevated; their dorsal outline concave, subcarinated, their tip deeply emarginated; nasal septum very thin, and so short as not to reach the end of the nasal tube. Culmen flattened from tube to unguis; latter much elevated and very convex. Shape of lower mandible that of *Larus*. Tarsus much compressed, shorter than middle toe without its claw; hardly exceeding the inner toe alone. Outer toe without its claw longer than the middle. Folded wings reach to end of tail. Primaries broad, tapering rather suddenly to their rounded apices. Tail contained 2¼ times in the wing from the carpal joint.

Bill yellow; nasal tube, unguis and sometimes basal portion of superior lateral mandibular laminæ, bluish horn. Feet yellow. Upper parts uniform clear pearl blue; exactly the shade that obtains in some species of *Larus*. This color begins as a faint wash or shading on the nape, deepening as it proceeds backwards until on the interscapular region it has gained its full intensity; which continues undiminished over the whole back, rump, wing coverts, tertials and tail coverts, to the tips of the rectrices themselves. The feathers just along the edge of the wing, however, are grayish slate. Primaries black,

their shafts yellowish white at the base, changing to black towards their apices; their inner webs pearly white near their tips. This white on the first primary extends to within two inches of the tip; on the rest successively extends nearer the tip of each, till on the innermost it occupies the whole web. Secondaries slaty black on their outer, white on their inner webs. Elsewhere the bird is pure white; except a small anteocular dusky spot; and a faint shade of pearl gray on the sides of the breast and body, and on the flanks.

Dimensions. Length 18 to 19 inches, extent of wings about 36. Bill along culmen 2, from feathers on side of lower mandible 1·75; its height or width at base ·70; nasal tubes ·66. Wing from the carpus 13. Tail 5·25. Tarsus 2; middle toe and claw 2·60; outer 2·70; inner 2·25.

There is no other species towards which the present bears an intimate resemblance. *Th. antarctica* is exceedingly dissimilar in color, though so nearly the same in form. The generic peculiarities—especiallyof the bill—of *Fulmarus glacialis* or *pacificus* at once distinguish the latter.

Synonymy. The *Proc. glacialis* of Forster's Descriptiones Animalium is undoubtedly this species. The expressions regarding the nasal tube—"coerulescens in rostro incarnato,*—apice nigro"; and regarding the primaries—"fusconigræ, margine interiore albido," are quite inconsistent with the true *glacialis*. This is the only instance I have met with of the application of the name "*glacialis*" to this species.

The *Procellaria tenuirostris* Audubon is most certainly this species. I have compared Audubon's type specimen with specimens of undoubted *glacialoides* from various localities. Mr. Cassin has shown (U. S. Expl. Exp. 1858, Birds, p. 409) that possibly Audubon's designation has priority over that of Smith.

I do not suppose that the var. *polaris* of Bonaparte's Conspectus is in any way diverse from the true *glacialoides*.

I hardly know upon what grounds Dr. Schlegel has laid aside the prior names of this species to give it the appellation "*Smithi*."

THALASSOICA ANTARCTICA Reich.

Procellaria antarctica, Gmelin, S. N. 1788, i. p. 565; et auct.
Thalassoica antarctica, Reichenbach, Syst. Av. t. 22, fig. 790. Bonaparte, Consp. Av. 1856, ii. p. 192.

In this species there is the same general character of the nasal tube as in *T. glacialoides;* though it is comparatively a little broader and shorter, and somewhat less carinated on the median dorsal line. The sulci uniting the different laminæ of the bill are rather deeper and more distinct, taking away something of the Laridine aspect, so marked in the other species. The lateral rostral lamina is wider at its base, and tapers more rapidly to the acute apex by which it is united to the unguis. The tip of the lower mandible is more decurved, and the gonys is a little concave.

The coloration of this species is so peculiar, and so widely dissimilar from any other Procellaridian, that it is needless to give any description here. The species has I believe no important synonyms.

OSSIFRAGA Hombr. et Jacq.

Procellaria sp. Gmelin, et auct.
Ossifraga, Hombron et Jacquinot.

Char. Tail of 16 rectrices, moderately long, rounded. Wings rather short, and not very pointed. Tarsi short, much less than the middle toe without its claw; compressed, stout, reticulated. Bill as long or rather exceeding the tarsus, very robust; the nasal case very long, depressed, carinated, the aperture small. Of immense size and powerful organization.

* "Bill black and flesh-colored, the latter hue fading to whitish on drying." I find on the label of a specimen collected by the North Pacific Exploring Expedition. I note this here because the bill is generally described as "yellowish" and to show how pertinent is Forster's expression "incarnato, apice nigro."

But a single species of this genus is known; which in size vastly exceeds all other *Procellarinæ*, and is only itself surpassed by the *Diomedinæ*.

OSSIFRAGA GIGANTEA (Gm.) Reich.

Procellaria gigantea, Gmelin, Syst. Nat. i. 1788, p. 563. Lawrence, Birds N. A. 1858, p. 825, et al. auct.

Ossifraga gigantea, Reichenbach, Syst. Av. t. 20, fig. 332. Bonaparte, Consp. Av. 1855, ii. p. 186.

?*Procellaria brasiliana*, Latham, Ind. Orn. ii. 1790, p. 821, No. 2. Gm. S. N. i. 178, p. 564.

Procellaria ossifraga, Forster, Descr. Anim Ed. Licht., 1844, p. 343.

"*Quebranthuesos*;" "*Bonebreaker*." VULGO.

Habitat. Chiefly the Southern Seas. Has been taken off the Coast of Oregon.

Bill exceedingly robust, compressed, higher than broad at the base; longer than the head, rather longer than the tarsus (chord of the arc of the culmen about equal to the tarsus;) sulci separating the rostral laminæ very distinctly defined. Nasal case very long, more than half the length of the culmen*; basally exceedingly broad, being nearly as wide as the bill; narrowing anteriorly to the small nearly circular apical orifice; on the upper surface so flattened as to be a little concave; the median carination strongly marked, though the ridge is rather broad than sharp, and more elevated anteriorly than at the base; the apex of the case vertically truncated, not emargined. The frontal feathers extend in an obtuse angle a little way upon the root of the case. Unguis large and strong, its dorsal outline very broad and not sharp; regularly decurved, its tip rather obtuse. Commissure much sinuated for its whole length. Gape of mouth moderate, the angle of the commissure falling far short of the eye. Outline of lower mandibular rami about straight: angle of gonys obtuse, its dorsal outline straight, ascending. Feathers of the chin extending quite to the symphysis. Feet very large and stout. Tibiæ bare for a considerable portion of their extent. Tarsus short, stout, much compressed, reticulated: the plates minute posteriorly and superiorly; larger and transversely very broad on the infero-anterior aspect. Toes very long; the outer with its claw as long as the middle; its claw alone shorter than that of the middle toe. Webs full. Hallux a very stout, nearly straight, subconical, obtuse claw. Wings short; not very pointed: when folded falling considerably short of the end of the tail. Tail of moderate length, or rather short for this group; much graduated; of 16 instead of as usual 14 feathers.

Dimensions. Averaging about 3 feet in length by 7 in extent. Bill 3½ to 4 inches. Tarsus 3½. Middle toe and claw 5¾: outer do. about the same; inner do. 4½. Wing from the carpal joint about 20 inches.

The species is found in quite diverse states of plumage. The upper parts are of a varying shade of brown, and more or less mottled with dull white, the edges and tips of many of the feathers being thus colored. Often however there are no traces of this white mottling, and the dorsal plumage is of a uniform sombre fuliginous. The wings and tail seem to be nearly always plain dark brown. In adult birds the under parts, and a portion of the neck in front are white. The amount of this white varies with age; and young or immature birds have the whole under parts similarly colored with the rest of the body; though the hue is usually rather lighter and duller. The gradations in color between old and young are very gradual; scarcely any two specimens, not perfectly mature, being found exactly alike. The feet of some specimens are yellowish, more or less obscured by dusky; of others are uniform fuliginous brownish black. The bill is yellow in all the specimens I have seen. As a remarkable state of plumage which I do not recollect to have seen given, I may instance a specimen in the Philadelphia Academy, which is *pure white* all over,

* But its length seems liable to some considerable variation. I believe it always extends nearly or quite to the root of the unguis.

even to the wings and tail; the continuity of the white only interrupted by a few isolated brown feathers sparsely scattered at irregular intervals over the body. Other specimens in the Academy Museum are in very nearly the plumage described by Gmelin and Latham as *P. Brasiliana*; so that there can be little doubt of the propriety of referring the latter to this species.*

The species and genera treated of in this paper are so few and so well known that an analytical synopsis does not seem to be required.

(To be continued.)

Description of twelve new species of UNIONIDÆ from South America.

BY ISAAC LEA.

The species described and figured in this paper were procured in South America by Don Patricio M. Paz, of Madrid, and very obligingly submitted to me. Some of them fortunately were in alcohol, thus preserving the soft parts, which are of great interest. These have been carefully examined and described, and it will be observed that the South American characteristics of the outer hard parts, as well as the included soft parts, which seem to pertain to the *Uniones* of that continent, are here exhibited. I allude more particularly to the *round palpi*, or mouth lips, and the *divergent folds* of the tips of the beaks, neither of which have I observed in our North American species. Very little attention, heretofore, has been given to the soft parts of the *Unionidæ* of South America, and none to the *embryonic shell*, except by myself. M. d'Orbigny, in his *Voyage dans l'Amerique Meridional*, has imperfectly described and figured the soft parts of some of the genera. Spix, in his *Testacea Fluviatilia Braziliensia*, takes no notice of the soft parts of the species, which he describes and figures with much accuracy.

UNIO PECULIARIS.—Testa lævi, quadrata, compressiuscula, inæquilaterali, postice obtuse angulata, antice rotunda: valvulis crassiusculis, antice aliquanto crassioribus; natibus subprominentibus, ad apices divaricati undulatis; epidermide virido-fusca, eradiata; dentibus cardinalibus parviusculis, compressis, obliquis, in utroque valvulo duplicibus; lateralibus longis, lamellatis curvisque; margarita cærul-o-alba et iridescente.

Embryonic Shell subtriangular, light brown; dorsal line rather long and straight; side margins irregular and unequal—one being a segment of a circle, the other an irregular curve line—forming an obtuse angle at the base: basal margin obtusely angular and furnished with hooks; granulate over the whole surface.

Hab.—South America, Don Patricio M. Paz.

This very peculiar and unique form is now for the first time observed. Its unequal lateral margins give it an abnormal and lopsided appearance, totally differing in this from any other species known to me.

UNIO FIRMUS.—Testa lævi, elliptica, subinflata, valde inæquilaterali, postice et antice rotundata; valvulis crassiusculis, antice aliquanto crassioribus; natibus prominulis; epidermide viridi-fusca, eradiata; dentibus cardinalibus subcrassis, compressis; in utroque valvulo duplicibus; lateralibus longis, lamellatis subcurvisque; margarita argentea et valde iridescente.

Hab.—South America, Don Patricio M. Paz.

UNIO RUGOSOSULCATUS.—Testa sulcata, triangulari, subinflata, subequilaterali, postice biangulata, antice oblique rotundata; valvulis percrassis, antice crassioribus; natibus prominentibus; epidermide olivacea, rugoso sulcata, obsolete radiata; dentibus cardinalibus crassis, rugosis, elevatis; later-

* Bonaparte (Consp. Av. ii. p. 172) makes the *Procellaria brasiliana* Gm. Lath. to be the bird now known as *Graculus* or *Phalacrocorax brasilianus*.

alibus sublongis, subcrassis, lamellatis subcurvisque; margarita argentea et iridescente.

Hab.—Central America? Don Patricio M. Paz.

Unio approximus.—Testa lævi, elliptica, inflata, inæquilaterali, postice emarginata, obtuse angulata, antice rotundata; valvulis percrassis, antice crassioribus; natibus subprominentibus, ad apices divaricate undulatis; epidermide castanea, micanti, substriata, obsolete radiata; dentibus cardinalibus grandibus et valde partitis; lateralibus prælongis, lamellatis, curvatis et decore granulatis; margarita argentea et iridescente.

Hab.—South America, Don Patricio M. Paz.

Unio locellus.—Testa lævi, elliptica, valde inflata, inæquilaterali, postice subrotundata, antice subtruncata; valvulis tenuibus; natibus subprominentibus, tumidis, ad apices divaricate undulatis; epidermide tenebroso-fusca, obsolete radiata, antice striata; dentibus cardinalibus parvis, valde compressis, valde obliquis, in utroque valvulo duplicibus; lateralibus parviusculis, lamellatis; margarita cæruleo-alba et iridescente.

Hab.—Buenos Ayres, South America, Don Patricio M. Paz.

Unio parcus.—Testa lævi, late elliptica, subinflata, valde inæquilaterali; postice subrotundata, antice rotunda; valvulis subtenuibus, antice aliquanto crassioribus; natibus prominulis, ad apices divaricate undulatis; epidermide polita, tenebroso-oliva, eradiata; dentibus cardinalibus parviusculis, obliquis lamellatisque; lateralibus longis, lamellatis subrectisque; margarita cæruleo-alba et iridescente.

Hab.—South America, Don Patricio M. Paz.

Unio acutirostris.—Testa lævi, oblonga, ad latere compressa, valde inæquilaterali, postice obtuse angulata, antice truncata; valvulis crassiusculis, antice crassioribus; natibus prominulis; epidermide tenebroso-fusca, nigriscente, eradiata; dentibus cardinalibus, parviusculis, in utroque valvulo sulcato divergente; lateralibus prælongis aliquanto curvatis granulatisque; margarita alba et valde iridescente.

Hab.—South America, Don Patricio M. Paz.

Unio ampullaceus.—Testa lævi, suboblonga, valde inflata, inæquilaterali, postice obtuse angulata, antice rotundata; valvulis crassiusculis, antice crassioribus; natibus subprominentibus, inflatis; epidermide tenebroso-fusca, rugoso-striata, eradiata; dentibus cardinalibus parvis, obliquis, lamellatis corrugatisque; margarita alba et iridescente.

Hab.—South America, Don Patricio M. Paz.

Unio Paraguayensis.—Testa lævi, elliptica, inflata, sublenticulari, valde inæquilaterali, postice et antice rotundata; valvulis subcrassis, antice crassioribus; natibus vix prominentibus; epidermide viridi-fusca, obsolete radiata; dentibus cardinalibus crassiusculis, obliquis, compressis, in utroque valvulo duplicibus; lateralibus sublongis, lamellatis curvisque; margarita argentea et valde iridescente.

Hab.—Paraguay, South America, Don Patricio M. Paz.

Monocondylœa lentiformis.—Testa lævi, rotundata, lenticulari, valde inæquilaterali, postice rotundata, antice curta rotundaque; valvulis subcrassis, antice crassioribus; natibus prominentibus, ad apices acuminatis, retusis; epidermide tenebroso-oliva, striata, eradiata; dentibus cardinalibus parviusculis, tuberculatis; margarita albida et valde iridescente.

Hab.—South America, Don Patricio M. Paz.

Monocondylœa Pazii.—Testa lævi, obovata, inflata, valde inæquilaterali, postice rotundata, antice curta rotundaque; valvulis crassiusculis, antice aliquanto crassioribus; natibus prominentibus, tumidis, retusis; epidermide

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tenebroso-oliva, striata, eradiata; dentibus cardinalibus subcrassis, compresso-tuberculatis, subelevatis; margarita alba et valde iridescente.

Hab.—South America, Don Patricio M. Paz.

ANODONTA PAZII.—Testa lævi, subrotunda, valde inflata, inæquilaterali, postice et antice rotundata; valvulis crassiusculis; natibus subprominentibus, acuminatis; epidermide tenebroso-rufo-fusca, eradiata, striata; margarita, punicea et formossissime iridescente.

Hab.—South America, Don Patricio M. Paz.

FASTI ORNITHOLOGIÆ.

BY JOHN CASSIN.

Woe be to the man who reads but one book!—*Rev. George Herbert.*

My starving bull,
Alack for me,
In pasture full
How lean is he!
Rev. Thomas Fuller.

No. 2.

DER NATURFORSCHER.

A Journal for Natural History, edited by J. C. D. Schreber and J. E. J. Walch.

"Der Naturforscher" was published at Halle from the year 1774 to 1804, that is to say, during a period of thirty years, one part or volume every year, though it is usually bound in fifteen volumes, octavo. Each of the thirty parts is, however, separately paged and has a title page and date of its own, and must be considered and treated as a volume for all practical purposes. The first thirteen volumes are edited by Walch, the last seventeen by Schreber, both of whom are contributors of a large number of papers in various departments of the Zoological and Botanical Sciences. In Zoology the papers of both are mainly on groups of the Invertebrata, but the latter occasionally has a valuable article on other subjects and higher orders of animals, and is the eminent and successful author of standard and elaborate works on Mammalogy.

The illustrations in this Journal are generally very superior, many of the colored plates, of Insects and Shells especially, being much above the average of those of a similar description to be found in books of the last century, and all of them seem to be quite sufficient for the easy recognition of species. There are about one hundred and fifty plates in the series, nearly all of which are carefully colored, those of Insects being the most numerous, but of Shells, also, there are a very considerable number. Special allusion will be made to the plates of Birds towards the end of this paper. Of the contents of the entire work as published, Indices and "Registers" are given at the end of every tenth volume, apparently very copious and accurate, and from which it appears that no less than six hundred and four memoirs in all departments of Natural History are contained in these thirty volumes. In Ornithology the contributions are not numerous, and contain but few descriptions of species, but of those few descriptions, nearly all the names proposed would stand good were it not for the recently exhumed names of Prof. P. L. S. Müller. The authors of these contributions are, for the greater part, quite unknown in modern times as ornithological writers.

"Der Naturforscher" seems to have been a very considerable journal in its day, and names amongst its contributors many naturalists of standard and deservedly high reputation. The memoirs on Conchological and Entomological subjects are apparently the most valuable, and are certainly the most numerous and most carefully illustrated. For better or worse it happens that comparatively few of its many papers are devoted to Ornithology, and a large majority

of those are of a general or local character, relating mainly to European birds, though several of them are highly interesting. In the entire series of thirty volumes, there are only seven descriptions of species presumed to have been previously unknown, and which we give in a succeeding page of this article; and, also, we propose to give an inventory or general reckoning of the entire ornithological contents of this periodical, not premising in the least that it is either an extended or difficult enterprise. But as we have frequently seen this Journal cited by the older authors, and even occasionally in books of recent formation, (mostly conglomerate,) we have looked up these ornithological articles to the end that hereafter they shall be seen truly, not only by ourselves, but also by such others who, like us, may have found out that there is a difference between hearing and believing, and even between looking and seeing. Any one can look, but comparatively few, see, and, at least, light shall no longer be wanting on "Der Naturforscher."

The words of our choice text for this interesting occasion, beloved brethren, we shall not dwell upon nor enlarge upon, even not so much as might conduce to solid profit in a moral sense; both somewhat of time and inclination being wanting, and an homily, fortunately perhaps, not necessary. Who has suffered, beloved, not for his fault, but thine? And in the vast affluence of the field of study and solid acquirement spread before thee, not only in the libraries and museums established by the governments of all civilized nations, but in our own times, in the countries of our native language and by our own contemporaries, such high souled and ever memorable men as Thomas B. Wilson and Henry Bryant, John Henry Gurney and Osbert Salvin, art thou indeed but a starvling? We wait not for answer, but proceed about our business with some soberness of thought, (and with recommendatory suggestion.)

Here follows a list of all the memoirs relating to Ornithology in this Journal, and, at the end of that, a list of the species of Birds therein described, as certainly intended and supposed by the authors (but generally erroneously,) for the first time.

List of memoirs on Ornithology in "Der Naturforscher," alphabetically arranged, after a fashion, so far as relates to the writers of them.

Bechstein, J. M. Bergrath.

1. Bemerkungen uber die Motacillen, vol. xxvii. p. 38, (1793.)

Beckmans, Johann, Professor zu Gœttingen.

1. Linneische Synonymie zu Kleins verbesserter Historie der Voegel, vol. i. p. 65, (1774.)

Bocks. Consistorialrath zu Kœnigsberg.

1. Preussiche Ornithologie, vol. viii. p. 39, (1776); ix. p. 39, (1776); xii. p. 131, (1778); xiii. p. 201, (1779); xvii. p. 66, (1782.)

Götz, Georg Friedrich. Candidatus in Hanau, Lehrer der Durchlauchtigsten Prinzessinnen zu Hessen-Cassel.

1. Anmerkungen zu des Herrn Professor Sanders zweytem Beytrag zur Geschichte der Vögel im 13 ten Stück des Naturforschers, S. 179, vol. xv. p. 157, (1781.)
2. Forgesetzte Beyträge zur Ornithologie, vol. xix. p. 78, (1783.)
3. Ueber die anomalisch weissen Vögel, vol. xvi. p. 37, (1781.)
4. Beytrag zur Naturgeschichte des Mauerspechts, Certhia muraria, Linn. vol. xvii. p. 40. (1782.)
5. Naturgeschichte des Silber und weissen Phasans, vol. xvi. p. 122, (1781.)
6. " des Goldphasans, vol. xiv. p. 204, (1780.)
7. " des Kronvogels, Columba coronata, Linn., vol. xvii. p. 32, (1782.)

Grillo, F. Professor.

1. Ornithologische Bemerkungen auf Veranlassung des Naturforschers bekannt gemacht, vol. xxii. p. 127, (1787); xxv. p. 13, (1791.)

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Günthers, D. Friedrich Christian, Herzogl. Sachsen Coburgischen Hofraths und Leibarztes zu Cahla.

1. Von der anomalisch-weissen Farbe der Voegel, vol. i. p. 54, (1774.)
2. Von der anomalisch-schwarzen Farbe der Voegel, vol. ii. p. 1, (1774.)
3. Vom Creuzvoegel, dessen Nest und Eyern, vol. ii p. 66, (1774.)

Kühn.

1. Von dem Gesange der Voegel, vol. xxi. p. 195, (1785.)
2. Von dem Krünitz oder Krumschnabel (Loxia curvirostra,) vol. xxi. p. 197, (1785); xxii. p. 142, (1787.)
3. Von dem Nachtschatten, Ziegen-Melcker (Caprimulgus,) vol xxi. p. 199, (1785.)

Leske.

1. Von den lymphitischen Gefässen in den Vogeln, aus dem 58 Band der philosophischen Transaction, vol. v. p. 188, (1775.)

Murr, Christian Gottleib, von.

1. Beschreibung des Patagonischen Pinguins, aus dem 58 Band der philosophischen Transactionen, vom Jahre 1769, vol. i. p. 258 (1774).
2. Von der besten Art, Vögel in Sammlungen aufzubehalten aus dem Gentlemen's Magazine vom J. 1772, vol. i. p. 262.
3. Beyträge zur Thiergeschichte von Ostindien, aus Pennant's Indian Zoology, vol. i. p. 265.
4. Von den Nestern und Eyern der Vögel. Ein Auszug aus Herrn Thom. Pennant's Genera of Birds, vol. i. p. 284.
5. Vom Flug der Vögel, vol. i. p. 291.
6. Von Ornithologischen Systemen, vol. i. p. 292.

Nau, B. S. Professor der Cameralwissenschaften zu Mainz.

1. Beiträge zu nähern Kenntniss der Naturgeschichte einheimscher Voegel, vol. xxv. p. 7 (1791).

Otto, Doctor und Adjunct.

1. Abhandlung von den Abartender Kreutzschnabel, vol. xii. p. 92 (1778).

Pacius, Georg Friedrich.

1. Zwo vortheilhafte Arten Voegel und kleine vierfüssige Thiere auszustopfen, vol. ii. p. 87 (1774).

Sanders, Professor zu Carlsruh.

1. Beyträge zur Geschichte der Voegel, vol. xi. p. 11 (1777), xiii. p. 179, (1779), xviii. p. 232 (1782).
2. Beobachtes Gewicht einiger Vogel-Eyer, vol. xiv. p. 48 (1780).

Schrank, Franz von Paula, Kurpsalzbaierschen geistlichen Rathe.

1. Zoologische Beobachtungeu, vol. xviii. p. 66 (1782).
2. Ueber die anomalisch weisse Farbe der Voegel, vol. xxiii. p. 138 (1788).

Schreber, J. C. D.

1. Beyträge zur exotischen Ornithologie, vol. xvii. p. 12 (1782), xviii. p. 1. (1782.)

Walch, J. E. J. Hofrath.

1. Von der anomalish-weissen Farbe der Voegel, vol. iv. p. 128 (1774).
2. Beyträge zur exotischen Ornithologie, vol. xi. p. 1 (1777), xiii. p. 11, (1779), xvii. p. 12 (1782).

The following are the species described as previously unknown:—

1. Trogon fasciatus, Schreber, Naturforscher, xvii. p. 17 (1782).
   Pennant Ind. Zool. p. 15, pl. 5.
   Trogon fasciatus, Gm. Syst. Nat. i. p. 405 (1788).
   Harpactes fasciatus (Schreber)!!

This name happens to be the same as that of Gmelin, but Schreber is the first to apply it, and is, therefore, to be cited as authority. It is given by both authors to the bird figured by Pennant as cited, but what that is cannot be so easily settled.

2. Todus cristatus, Schreber, Naturfors. xvii. p. 21 (1782).
Buff. Pl. Enl. 289. Der Naturforscher, xvii. pl. 7.
Up to Gmelin, the synonomy of this species stands:
Muscicapa coronata, Müller, Syst. Nat. Supp. p. 168 (1776).
Todus cristatus, Schreb., Der Naturfors. xvii. p. 21 (1782.)
Todus regius, Gm., Syst. Nat. i. p. 445 (1788.)
Muscivora coronata (Müller)!!

3. Xanthornus virens, Schreber, Naturfors. vol. xviii. p. 1 (1782.)
Buff. Pl. Enl. 328, Der Naturf. xviii. pl. 1.
The synonymy of this species is:
Oriolus viridis, Müller, Syst. Nat. Supp. p. 87 (1776.)
Xanthornus virens, Schreb., Der Naturfors. xviii. p. 1 (1782.)
Oriolus viridis, Boddaert, Tab. Pl. Enl. p. 20 (1783.)
Cassicus viridis, Vieill. Nouv. Dict. v. p. 364 (1816.)
Cassicus viridis (Müller)!!
Müller comes in again several lengths ahead of Schreber and Boddaert, and Vieillot is nowhere, though currently reported for about fifty years as having won, by error of the judges. Both of Schreber's plates above cited are recognizable and, in fact, much better than usual at the date of the performance. This is the same Schreber famous as a Mammalogist, but the papers here referred to are his only attempts at Ornithology, so far as I know, and so successful that his three species here mentioned would have stood, but for Prof. Müller's long-neglected names.

4. Scolopax punctata, Nau, Naturfors. xxv. p. 7 (1791.)
"Scolopax rostro arcuato, gula rufescente, dorso fusco, punctis albis, pedibus nigris." Hab.—Europe.
Probably the young or a seasonal plumage of *Totanus ochropus*, and also probably the same plumage subsequently described as *Tringa littorea*, Lath. Ind. Orn. ii. p. 731. A full description is given in German, which seems applicable, as we have stated. Professor Nau is or was well known as a Botanist, but this is his first and only appearance as an Ornithologist.

5. Motacilla longirostra, Bechstein, Naturfors. xxvii. p. 43 (1793.)
Quite an extended description of this species is given by Bechstein, but I fail to recognize it, and do not find it again alluded to in the works of that author. It is given as an European bird.

6. Motacilla Sibilatrix, Bechstein Naturfors. xxvii. p. 47 (1793.)
Sylvia sylvicola, Lath. Ind. Orn. Supp. p. 53 (1801.)
Phyllopneuste sibillatrix (Bechst.) Brehm!

7. Motacilla Fitis, Bechstein, Naturfors. xxvii. p. 50 (1793.)
Motacilla Trochilus, Linn. Syst. Nat. i. p. 338 (1766)?
Phyllopneuste fitis (Bechst.) Brehm!!
The plates of birds are as follows:
Pipra rupicola, Linnæus, vol. xi. pl. 1.
Gracula carunculata, Gmelin, vol. xi. pl. 2.
Picus miniatus, Gmelin, vol. xiii. pl. 4.
Muscicapa coronata, Müller, vol. xvii. pl. 1.
Oriolus viridis, Müller, vol. xviii. pl. 1.

List of the BIRDS of Fort Whipple, Arizona: with which are incorporated all other species ascertained to inhabit the Territory; with brief critical and field Notes, descriptions of new species, etc.

BY ELLIOTT COUES, A. M., M. D.

(Assistant Surgeon U. S. Army.)

The Territory of Arizona comprises that portion of what was formerly the vast Territory of New Mexico lying west of the 109th meridian; together with an extensive tract obtained from Mexico, known as the "Gadsden purchase." As at present bounded, Utah and Nevada form its northern limit, while its southern border is contiguous in its whole extent to the Mexican State of Sonora. The Colorado River separates the greater portion of its western border from California; the extreme southwestern corner of the Territory being at the junction of the Gila with the Colorado River.

The extensive area thus bounded, constitutes, in connection with New Mexico, what is known, in relation to its Faunal characteristics, as the "Southern Middle Province" of the United States.* It possesses marked features whereby it is distinguished from the western littoral Province, or Pacific region proper, as well as from the Eastern Province. Most of the characteristics of the Arizonian Avifauna are shared to a considerable degree by that of New Mexico; the main points of discrepancy being those few wherein the valley of the upper Rio Grande differs from that of the Colorado. It does not appear that the difference between the two slopes of the main chain of the Rocky Mountains is in this region very strongly marked. In general terms it may be affirmed that the Ornis inclines in character decidedly towards that of the Pacific region proper, as might be expected from the position of Arizona relative to the main chain of the mountains just named. But still notable differences from the truly littoral Fauna are apparent; and there can be little doubt that the presence of so extensive a desert just west of the Colorado exerts much influence in producing this result. At certain points however in this desert, some species, respectively typical each of its own habitat, are known to meet.† The features, dependent upon latitude, which separate Arizona from adjacent regions, to the north or south, are by no means so marked as those which distinguish it from the countries lying east and west, and mainly consist in the introduction into the lower warmer parts of the Territory, from Sonora, of several Mexican and subtropical species. A "wedge," so to speak, of these types is pushed a little northward of Mexico, and they are readily recognizable as a somewhat prominent element among the birds of Southern Arizona, and of the Colorado valley for a considerable distance. Perhaps this is more decidedly the case here than at other points on our southern border. A considerable number of species properly belonging to the United States Fauna, and generally distributed throughout Arizona, retire in winter beyond the Sonoran border; while at the same time it is interesting to note that some species‡ breed quite high up in Arizona, or even further north, which are at the same time summer residents of the table lands of Mexico. To the northward, neither the climate nor physical geography of

* See the American Journal of Science and Arts, vol. xli., Jan. and March, 1866; "On the Distribution and Migration of North American Birds, by Spencer F. Baird," where the several provinces into which North America is divisible are characterized, and the peculiarities of their Avifaunæ indicated.

† *E. g.* The *Lophortyx Gambeli* and *L. Californicus*, and very probably also some species of Jays; along the Mojave River, which rises in the San Bernadino Mountains, and flows eastwardly towards the Colorado River, affording a degree of fertility which is an inducement to the species just named and to others.

‡ *E. g.* *Hesperiphona vespertina*, *Carpodacus Cassinii*, *Curvirostra americana*, *Plectrophanes melanomus*, *etc.*

Arizona are sufficiently diverse from those of adjacent Territories to produce any special differences in their Avifaunæ; unless indeed the apparent absence of one family* can be substantiated as a marked peculiarity.

Some facts of physical geography have a marked influence upon the birds. From the dearth of water throughout almost every portion of the Territory there results, as a natural consequence, a great paucity of Grallatorial and Natatorial forms; so much so, that with a few prominent exceptions, a list of the Water Birds of the Territory is little more than an enumeration of those of the Colorado and Gila Rivers. There is also to be noted, as an interesting fact, the effect of the hot, arid, desert wastes of the region of the Gila, and Southern Arizona generally, upon the colors of the species found there. A light, dull, apparently faded condition of plumage, in which some shade of gray is a predominant tint, and all lines and streaks are more or less obsolete in character, is met with in numerous instances, forming true local races or varieties. In other cases† the specific characters which distinguish birds of this middle southern province from other closely allied species, partake in a measure of this peculiarity.

Our knowledge of the Ornis of Arizona has been hitherto chiefly obtained from the collections made by the naturalists attached to several of the United States Government Surveys of various regions of the West. The expeditions along the 35th and the 32d parallel passed through different portions of the Territory; the Mexican Boundary Survey along its southern border; that of the Colorado passed up the river to the head of navigation. The first mentioned of these, under Capt. A. W. Whipple, with Dr. C. B R. Kennerly and Mr. H. B. Möllhausen as naturalists, passed very near the present site of Fort Whipple; and its collections agree most closely with my own. Collections of some private individuals have added materially to the results of these Explorations; especially those of Dr. J. G. Cooper, who spent several months at Fort Mojave, on the Colorado River, in latitude 35° N. To the observations and collections of this gentleman I shall have frequent occasion to allude; and I am indebted to him for free access to his MSS. notes, which are of special interest and value, not only as adding some species to my list, but as affording an opportunity of comparing the birds of Fort Whipple with those of a point in the Colorado valley, at nearly the same latitude; whereby the effect of the differences in physical geography is finely elucidated. My own observations, made during the sixteen months I resided in Arizona, extend over the Territory from east to west, chiefly near the line of the 35th parallel; and along the valley of the Colorado from Fort Mojave to Fort Yuma. It was chiefly at Fort Whipple, and the mountainous region of that vicinity, that my collections were made. This particular locality possesses a rich and varied Avifauna; numerous features of which are quite peculiar, as might be expected from the following facts regarding its situation and relations.

Fort Whipple is very nearly in latitude 34° 30′ N., longitude 112° W. (from Greenwich.) It is difficult to give an estimate of the altitude of the vicinity with anything more than approximate accuracy, in consequence of the broken and varied nature of the surface. It may be stated, in round numbers, as between 4000 and 5000 feet; but in several directions, and more particularly to the southward, there are confused masses of short mountain ranges or abrupt isolated peaks, which rise far above the level indicated by the preceding figures. The altitude of the San Francisco mountains, about sixty miles a little east of north of Whipple, has been fixed at about 12,000 feet. The main point of interest which attaches to this particular locality—Fort Whipple—

* The *Tetraonidæ*. I have never seen nor heard of a single species of grouse in Arizona. But the northern portions of the Territory are so imperfectly explored that it is not safe to assert their entire absence. Dr. J. G. Cooper has seen the *Centrocercus urophasianus* on the Mojave River; the southernmost point, I believe, from which it has thus far been recorded.

† Of which *Harporhynchus Lecontei* or *crissalis*, as distinguished from *H. redivivus* of the Pacific coast, is a good example.

is that it is nearly upon the dividing line between two tracts of country quite diverse from each other in those points which chiefly affect the distribution and migration of species. A single day's journey to the southward gives us changes in the birds, so great, that I do not hesitate in comparing the difference to that which exists between the Middle Atlantic and the Gulf States, in the eastern Province. Very numerous species,* not detected at any season at Fort Whipple, are yet found abundantly within fifty miles to the south and southwest. At the same time the locality is a true component of the elevated and cold regions to the northward, and assimilates in this respect to Utah and Nevada. Intermediate in situation between the two great valleys of southwestern United States—those of the Rio Grande and Colorado Rivers,—it draws tribute in a measure upon each of them, though, as might be supposed, vastly more from the latter than the former. In this connection I may advert to an interesting point, which I consider as quite probable, though contrary to the usual laws of migration; viz., that many of the birds of the Colorado valley, which are there winter residents, instead of migrating far to the north in spring, by turning simply to the eastward, find in the region of which Fort Whipple is the southern limit the conditions necessary for breeding grounds. That such is a fact would seem to be indicated by comparing the forms common to both Mojave and Whipple; the summer residents or spring migrants of the latter place being usually winter residents at the former locality; but can only be incontrovertibly proven by showing that some species wintering at Mojave are not found directly north of that point in summer; and that they do breed in the Whipple mountains.

The seasons are well pronounced at Fort Whipple, and do not differ notably from those of the Middle Atlantic States. This enables us trenchantly to divide those of its birds which are not permanent residents, into summer and winter residents, and migratory species passing through in the spring and autumn. And I have noticed in many instances that the times of arrival and departure of non-residents are strikingly similar to those of the migratory species passing through Washington, D. C. Quite the reverse is the case in southern Arizona; where the protracted heat and drought of a long summer, which encroaches on intermediate seasons, disturbs the regularity of migration; or even entirely takes away from some species the migratory impulse.

The immediate vicinity of Fort Whipple is admirably adapted to ornithological pursuits in the very varied character of surface presented within the compass of a day's walk. Pines constitute the main feature of the Sylva, covering all the mountains down to what may be considered as the average altitude of the locality. An extensive undulating plain stretches to the northward, partially grassy, partially covered with the characteristic shrubs of the country. Ranges of broken low hills, sparsely covered chiefly with several species of dwarf oak, or so nearly naked as to be little more than huge masses of metamorphic rocks, attract their share of species. The head of one of the forks of the San Francisco River flows past; at times a considerable stream, but usually dry. The vegetation along this, as well as all other water courses of the Territory, has as its most prominent element the ever present *Populus monliferus*; together with species of *Salix*, *Prunus*, *Castanea*, etc., the bases of which trees are as usual tightly sewn together by a tangled matted network of rank undergrowth; the whole forming a tract peculiarly yielding, as every ornithologist knows, of variety and value in specimens. A small rather open swamp near by affords several species, which, but for its presence, would not form a part of the birds of the locality.

By adding to the species observed at Fort Whipple, and characteristic of that locality, such others as have been ascertained to inhabit any portion of the Territory, the subjoined list becomes an exposition of the present state of

* For example: *Chordeiles texensis*, *Pyrocephalus mexicanus*, *Catherpes mexicanus*, *Vireo pusillus* (n. sp.) *Pipilo Abertii*, *P. mesoleucus*, etc., etc.

our knowledge of the Arizonian Ornis. I have included no species in the list which has not actually been detected in the Territory, or which must necessarily be found there, from the known range of its habitat; but frequent reference is made to species, not yet recognized as components of the Arizonian Avifauna, which in all probability are hereafter to be detected. In view of the favorable circumstances attending the preparation of the list, I do not think that very many species remain to be added to it. Still, as my operations were conducted at the most imminent personal hazard from the continued presence of hostile Indians,—the wily and vindictive Apachés—which always cramped, and at times necessitated entire cessation of investigations, it may be perhaps that some species have been overlooked; and I have only the same excuse to offer, for some other shortcomings, of which no one can be more fully aware than myself. I have taken care to eliminate the Whipple birds, as contradistinguished from all others of the Territory, in order that attention may be drawn to their peculiarities; considering the Fauna of any natural geographical region as more interesting and instructive than that comprised within arbitrary political boundaries, since the latter almost always include fragments of two or more diverse Faunas; of which fact the very region now under discussion affords an example. The Whipple species are preceded by an uninclosed number; all others have their number in parenthesis. It has been my aim merely to add to the remarks elucidative of the distribution of the species, such purely technical observations, comparisons of closely allied forms, descriptions of immature or little known states of plumage, as seemed quite pertinent to the subject. In a few cases synonymy is introduced for reasons which will be obvious. Except in a few instances of special interest I have not touched upon the natural history proper of the species, reserving for future elaboration the mass of ornithobiographical notes which I have taken care to accumulate. All remarks are to be understood as referring to the species as observed at Fort Whipple, and by myself, except when the contrary is explicitly stated.

VULTURIDÆ.

1. CATHARTES AURA (L.) Illig.
Summer resident; abundant. Arrives last week in March; remains until latter part of October. Resident in the southern portions of the Territory.

(2.) CATHARTES CALIFORNIANUS (Shaw,) Cuv.
Resident in Southern Arizona. Individuals observed at Fort Yuma, in September, 1865.

FALCONIDÆ.

3. FALCO (TINNUNCULUS) SPARVERIUS L.
Resident; very abundant. In highly-plumaged spring birds, the cere, the feet and the edges of the eyelids are bright vermilion, not yellow: the claws and bill bluish black.

4. FALCO (HYPOTRIORCHIS) COLUMBARIUS L.
Common; resident. "A specimen taken by me at Fort Mojave is remarkable for its light colors" (*Cooper*). A light, dull, faded condition of plumage has been already adverted to as characterizing, in many instances, birds from the Gila and Colorado Valleys.

In the immense series of "Pigeon"-Hawks which I have examined from all parts of the West, I find a few specimens which constantly differ, to a marked degree, from any and all of the exceedingly diverse plumages under which the typical *F. columbarius* presents itself. These specimens are invariably much larger than any others in the series; are much lighter colored, (yet not dull or faded,) and differ constantly in the increased number of light and dark bars on the tail. Compared with a European specimen of

Falco æsalon, they agree in every particular. I think it most probable that future careful research will demonstrate satisfactorily the existence of a species hitherto usually confounded with some of the protean plumages of *F. columbarius;* but quite distinct from the latter, and doubtless referrible to the European type above mentioned. In fact, a *Falco æsalon* has been quoted by Townsend and Nuttall as from the northwestern portions of the United States; though not usually recognized by later ornithologists.

(5.) FALCO (HYPOTRIORCHIS) FEMORALIS Temm.

South Arizona, near the Sonoran border. Specimens were obtained by Lieut. J. G. Parke's Expedition along the 32d parallel; and by the Mexican Boundary Survey.

It is quite possible that the *F. aurantius* Gm. extends northward through Sonora into the southern portion of Arizona.

6. FALCO POLYAGRUS Cassin.

? Falco mexicanus,* "Licht. Mus. Berol.," Schlegel, Abhandl. Geb. Zool. u. Vergl. 1841, p. 15. Schlegel, Falcones, Mus. d'Hist. Nat. Pays-Bas, 1st, 1862, p. 18.

Falco (Gennaia) polyagrus, Cassin, Birds N. A. 1858, p. 12.

Sparingly distributed throughout the Territory. Not observed at Whipple, though doubtless to be found there. Colorado Chiquito River, *Kennerly*.

(7.) ACCIPITER COOPERI Bon.

This generally distributed species is found throughout the Territory.

8. ACCIPITER MEXICANUS Swains.

Common, resident. Iris, cere, legs, and feet light yellow. Bill bluish black. Claws black.

I have seen young birds of this species, reared by hand from the nest, so thoroughly domesticated as to come to their master on being whistled for, and perch upon his shoulder, or follow him when shooting small birds for their food. They were allowed entire liberty. Their ordinary note was a shrill and harsh scream; a low, plaintive, lisping whistle was indicative of hunger.

The shape of the tail of this species is decidedly less rounded than that of *Cooperi*, and is a feature of considerable value in distinguishing the female *Mexicanus* from the male *Cooperi*.

9. ACCIPITER FUSCUS (Gm.) Bon.

Resident. Abundant throughout the Territory.

10. BUTEO "MONTANUS" Nuttall.

B. montanus, Nuttall, Manual, 1840, i. p. 112; and of later American writers generally: equals *B. borealis* from Western North America.

B. borealis, (Gm.) Gray, Genera, i. 1849, p. 11. Bryant, Remarks on Variations of Plumage of *Buteo borealis*, etc., in Pr. Bost. Soc. Nat. Hist. for 1861: considers *montanus* Nutt., *calurus* Cass., and probably also *Cooperi* Cass., as referrible to *borealis*.

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*I think it very likely that *polyagrus* is not the first distinctive name this Hawk has received. The description of *Falco mexicanus* by Schlegel, as above cited, is substantially as follows:—"Wing 11.50 to 13; tail 6.50 to 7.50; legs finely scaled, feet yellow; above brown, paler on the tail; head and nape edged with rusty brown; quills with rust-colored spots; stripe through the eye, spot on nape, and middle of auriculars whitish; beneath white, each feather with a narrow blackish drop-shaped spot; large lateral feathers covering flanks brown, with some rust-colored transverse spots. The young bird has the edges of the feathers above light, the spots below larger, and the feet greenish yellow." A fuller description is in the first number of Dr. Schlegel's Catalogue of the Pays-Bas Museum, above cited. These descriptions are pertinent to *F. polyagrus* in most respects; but, in view of some discrepancies, (color of the legs, which, in *polyagrus*, are light dull blue, etc.,) I do not wish, at present, at least, to make the change of names, though such a procedure may hereafter be considered necessary. Mr. Cassin himself refers (B. N. A., 1858, p. 12,) to this name of Dr. Schlegel's, as very probably the first designation of the species.

B. Swainsoni, Bonaparte, Conspectus, i. p. 19. Cassin, Birds Cal. and Tex. i. p. 98 (1853); but not of Cassin, B. N. A. (1858).

Falco buteo, Audubon, Orn. Biog.; Sw. & Rich. F. B. A., according to Cassin.

The most abundant and characteristic species of the larger Hawks; resident, but particularly abundant during the winter months. It may be readily recognized at any distance, when flying, by the very dark-colored area presented by the lesser under wing coverts, sharply contrasted against the very light colors of the rest of the under surface of the wings. The iris is clear light brown; the bill bluish black; the cere, legs and feet light yellow.

In the Proceedings of the Boston Society of Natural History for 1861, appeared a paper by Dr. Henry Bryant, on the variations of the plumage of Western North American *Buteones:* in which facts are elicited tending to demonstrate that nearly all the species enumerated as valid by Mr. Cassin, in 1858, may be reduced to two. One of these, of which *borealis* Gm may be taken as the type or parent stock, and for which the name must stand, is large and muscular, with a strong bill, long stout tarsi, and a rounded wing. Here Dr. Bryant would range *montanus* Nutt., *calurus* Cass., and probably also *Cooperi* Cass.; together with a specimen in the Philadelphia Museum, which has been labelled and usually called *Harlani*. The other species is distinguished by its smaller size, more slender form, longer and weaker tarsi, and more pointed wing. *Harlani* * Aud. is considered as the first name of this species; and to it are referred *Swainsonii*,† *Bairdii* of Hoy ‡ and of Cassin; *insignatus*,§ Cassin, and *oxypterus* ‖ Cassin. Dr. Bryant gives careful measurements of these supposed species, having access to the types of many of them, and finds that, if we are to take size and proportions alone as indicative of specific validity, we can admit but the two species he characterizes; while, if we are to be guided by color, we cannot avoid still further increasing the number of species to be recognized to such an extent, that (together with the other undoubted species, such as *lineatus*, *pennsylvanicus*, etc.,) we should have a total of twenty-three inhabiting North America.

It cannot be denied that our constantly increasing knowledge of the distribution of North American *Buteones*, and of the "theory of variation" which is applicable to them, decidedly tends towards a confirmation of Dr. Bryant's views. Nevertheless, I am by no means prepared to accept without reservation the extreme conclusions arrived at. I prefer, at present, to enumerate the species—or varieties, if they are only such—as determined by Mr. Cassin; considering the names given as at least indicative of strongly marked, and apparently geographical, though perhaps not permanent, varieties.

11. BUTEO "CALURUS" Cassin.

B. calurus, Cassin, Pr. A. N. S. Ph. 1855, p. 281; and B. N. A. 1858, p. 22.
"*B. borealis* Gm." Bryant, l. c.

Resident at Fort Whipple, and by no means rare. Specimens taken in the winter of 1864—5, and in April following. Orig. No. 1246; ♀. Length 23·75; extent 55·50. Iris light yellow. Bill dusky bluish horn. Cere dull yellowish green. Mouth livid flesh color. Legs and feet chrome yellow. Claws black.

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* "*Harlani* Aud.," of which the type is in the British Museum, is given by Gray (Cat. Brit. Mus. *Accipitres*) as *borealis*. If such be the truth, that Audubon's species was founded upon the fuliginous state of plumage of *borealis*, then *Swainsoni* Bp. is the first distinctive name of the smaller of the two species recognized by Dr. Bryant.

† Of Bonaparte, Comp. List, 1838, p. 8, as defined by Cassin, B. N. A., 1858, p. 19.

‡ *B. Bairdii*, Hoy, Pr. A. N. S. Ph. vi. 1853, p. 451.—Cassin, B. of Cal. and Tex. pl. 41.—Idem, B. N. A., 1858, p. 21.

§ *B. insignatus*, Cass., B. of Cal. and Tex., 1854, p. 102, pl. 31.—B. N. A., 1858, p. 23.

‖ *B. oxypterus*, Cass., Pr. A. N. S. Ph. vii. p. 282.—Id. B. N. A., 1858, p. 30.

My specimens have a large pectoral area dark chestnut brown, not very different in color from the superior aspect of the tail. I have seen other specimens from Fort Tejon, Cala., in which the breast is still brighter chestnut, in marked contrast to the fuliginous brownish black of the rest of the plumage. Utah, New Mexico, Arizona and California seem to constitute the special range of this species or variety.

B. "*Cooperi*" has only been taken from Southern California, (Santa Clara County, *Cooper*,) and, as but a single specimen is known, it is impossible to decide with certainty upon its relations to *borealis*.

(12.) BUTEO "HARLANI Audubon."

Individuals identified with this supposed species of Audubon by Mr. Cassin and Mr. Lawrence are from New Mexico and California; so that the bird necessarily ranges over the intermediate ground of Arizona.

Dr. Bryant considers that the specimens thus identified present nothing incompatible with their being regarded as a variety of *borealis*. And it is quite probable that the specimen upon which Audubon himself based the name "*Harlani*" is really referrible to a state of plumage of *borealis*. This must be finally determined by examination of the type in the British Museum. But the name "*Harlani* Aud." is employed by Dr. Bryant in his paper to designate a species radically distinct from *borealis* in all its variety, and is the one to which the three following names are by him referred.

13. BUTEO "SWAINSONI" Bonaparte.

B. Swainsoni, Bp. Comp. List, 1838, page 3. Cassin, l. c.

B. vulgaris, Audubon; Swainson & Richardson; but not of European authors.

B. Harlani, Bryant, l. c. (Provisionally adopts the name, proposing to accept that of *Swainsonii* Bp. in event that *Harlani* Aud. proves to be a variety of *borealis*.)

A species or variety of extensive distribution throughout the West. Colorado Chiquito River, Ariz., *Dr. C. B. R. Kennerly*. I never met with it at Fort Whipple, though, beyond a doubt, it is to be found there.

Some of the states of plumage of this bird are so exceedingly similar to those of *B. vulgaris* of Europe, that it has been thus malidentified by certain American writers. See Cassin, B. N. A., pp. 19, 20, 21, for elucidation of changes of plumage, geographical distribution, and synonymy.

(14.) BUTEO "OXYPTERUS" Cassin.

B. oxypterus, Pr. A. N. S. Ph. vii. 1855, p. 282. Idem, B. N. A. 1858, p. 30.

B. Harlani Bryant, l. c.

Not actually detected within the limits of the Territory; but the original locality whence the type of the species was described is so near the borders of Arizona as to render it most probable that the species will be hereafter detected. (Fort Fillmore, N. M., *Dr. T. C. Henry*.)

(15) BUTEO "INSIGNATUS" Cassin.

B. insignatus, Cassin, B. of Cal. and Tex., 1854, p. 102, pl. 31. Cassin, B. N. A., 1858, p. 23.

B. Harlani, Bryant, l. c.

The known range of this species or variety includes Arizona.

The bird first characterized by Hoy and subsequently by Cassin as *B. Bairdii* (by Dr. Bryant also referred to "*Harlani* Aud.,") has not, to my knowledge, been taken as far south as Arizona, though detected at various other points in the West.

16. *Buteo elegans* Cassin.

Rare; and only known as an inhabitant of Arizona from a single specimen taken on the Colorado Chiquito by Dr. Kennerly. I am informed by Dr. Cooper that it is an abundant bird in Southern California. It will doubtless be hereafter found at Whipple.

This fine species is radically different from any of the foregoing *Buteones*, belonging to a group subgenerically distinct, partially characterized by a different amount of feathering of the tarsi. Among North American species it is only intimately related to *lineatus*, from which species the study of its neossology readily enables us to distinguish it.

(17.) BUTEO ZONOCERCUS Sclater.

B. zonocercus, Sclater, Trans. Zool. Soc. Lond. 1858, p. 263.

A single specimen, procured on the Gila River, Sept. 24, 1864. The species is doubtless restricted in its northern range to the warm valleys of the Gila and Lower Colorado.

This interesting Mexican species was first found within the limits of the United States by the indefatigable Cooper, who procured a specimen in Santa Clara County, California. Without being aware of this at the time, I rediscovered it myself in Arizona; an additional example of what has occurred in several instances in our operations in the West, during the greater part of which each was ignorant of the other's exact whereabouts and labors. I must yield to my friend the priority of discovery, although I have the pleasure of first presenting the species in an American publication as an addition to the United States Fauna.

18. ARCHIBUTEO FERRUGINEUS (Licht.) Cassin.

Buteo ferrugineus, Lichtenstein, Trans. Acad. Berlin, 1838, p. 428.
Archibuteo ferrugineus, Cassin, B. N. A. 1858, p. 34.
Archibuteo regalis, Gray, Genera, i. pl. vi. (desc. nulla.)
Buteo Californicus, A. J. Grayson, Hutchins' Cal. Mag. 1857.

This large, noble, and by far the handsomest of our Falconines, hitherto only known from California, is found quite abundantly about Fort Whipple, especially in winter. It is probably a permanent resident there. It chiefly frequented meadows, plains and more open woods. I observed it to be quite numerous on the dry, level, grassy plains of Southern California. I usually found the stomach filled with *Geomys*, *Arvicola*, or *Hesperomys*. In life it may always be readily recognized by its conspicuously white under parts, contrasted with its dark chestnut tibiæ and reddish back.

No. 1114, taken Dec. 2, 1864. Male. Length 22·50; extent 54·50; wing 16·25; tail 9·50; tibia 4·80; tarsus 3·25; middle toe 1·25; its claw ·75; outer toe ·85; its claw ·55; hallux 1·00; its claw 1·00; bill along culmen 1·50; along gape 2·00; its depth at base ·90. No. 1115, taken Dec. 6, 1864. Female. Length 23·25; extent 56·50; wing from carpus 16·75; tail 10·00; tarsus 3·40; the other measurements not differing notably from those of the male above given.

When perfectly adult, the whole under parts, from chin to under tail coverts, inclusive, are pure white. In the majority of specimens, however, there will be found a few slender, sharp, shaft lines of black on the chin; which, as they pass down the breast, become broader, and tinged with chestnut. Usually, also, the feathers of the flanks have small, isolated, interrupted and incomplete bars of chestnut and black. Less mature specimens exhibit a continuation of these bars quite across the lower part of the abdomen, and they are so broadened as to form somewhat hastate spots. Some of the feathers of the flanks are tipped with chestnut. The chief other variations in adult birds seem to be a greater or less intensity of the deep color of the tibiæ, a lighter or darker shade of ferrugineous on the back, and a fainter or more decided wash of pearl grey on the superior surface of the tail.

The bill is dark leaden bluish black. The mouth is light purplish flesh color, becoming livid bluish on the corneous portions. The cere, edges of the commissure, tarsi and toes are bright chrome yellow. The claws are black. The naked skin just over the eye is greenish, tinged with crimson posteriorly. The iris of adult birds is fine light yellow; of young ones brown, more or less ochraceous with increasing age.

The following brief anatomical notes may be of interest, as the species has not hitherto been dissected. They relate chiefly to the alimentary canal:

Anatomical Notes. On the roof of the mouth a narrow but prominent median ridge runs from the very apex of the upper mandible to the fissure of the posterior nares, widening, becoming less sharply defined, and more obtusely papillated towards its posterior extremity. At a point about a third of its length from its termination it is crossed at right angles by a very short, transverse ridge, which connects it on either side with a lateral ridge. These lateral ridges run parallel with each other as far back as the Eustachian orifice, and are papillated for their whole length, which papillæ are anteriorly sparsely distributed, short, stout and obtuse; posteriorly gradually becoming thick-set, long, soft and acute. The ridges themselves terminate abruptly in the smooth, soft, mucous membrane of the posterior portions of the palate, measuring 1·60 inches in length. That portion of the palate between these ridges and the nasal fissure is roughened by numerous short, blunt tubercles. From the extremity of that portion of the nasal fissure which has soft, elevated, approximable ridges, there runs outwards on either side a fringe of delicate papillæ. Rather more than the posterior third of the nasal fissure stands broadly open, and has hard, immobile, bony edges, over which the mucous membrane is tightly and smoothly stretched. The nasal aperture measures in total length 1·25. Just posterior to it, on the median line of the palate, is the opening of the Eustachian tube, situated in the centre of a smooth, somewhat vaulted space. In shape it is oval, and its edges, though somewhat mobile, are not completely approximable. From its posterior extremity, on either side, a fringe of soft papillæ curves obliquely outwards and forwards. The rest of the palate is not noticeable. Posteriorly it is very soft, and numerous vessels may be seen ramifying beneath its mucous membrane. Anteriorly it becomes harder and more fibrous, and finally, towards the tip of the bill, quite corneous.

The tongue is large and fleshy, its tip obtusely rounded, its lateral outline convex, its dorsum with a median furrow, its under surface with a corresponding ridge, its posterior extremity deeply bifid, the edges of the fork corneous, and armed with stiff, hard, papillæ. The outermost of these papillæ is greatly developed, forming a large, strong, acutely pointed spine. The tongue is ·75 long; its laryngeal fissure ·50. The elevated space just posterior to the rima glottidis is pure white, and thickly beset with stiff, acute papillæ, some of which have black tips.

On the floor of the mouth, on either side of the frenum linguæ, at the apex of the angle formed by the divergence of the inferior maxillary rami, lies a thin, flattened, broadly oval gland, a third of an inch long, of a deep purplish red color. Its surface is studded with numerous depressed punctæ, the orifices of the emunctory ducts.

The trachea is 5·50 inches long, and ·45 wide at its superior extremity; rings about 90 in number. It is broad and much flattened superiorly, but towards the lower larynx becomes more cylindrical. The lateral muscles are well developed. The lower larynx, as usual in this order, is quite simple. The bronchial half-rings are 15 in number, all small, soft and weak.

The œsophagus is extremely capacious and dilatable. The distended crop is irregularly ovoid in shape; 3·50 long by about 2·25 wide.

The proventricular glands form a complete zone, with a uniform width of 1·25. The proventricular parietes is about one-twelfth of an inch in thickness. The individual glands are large enough to be readily discernible to the naked eye; closely aggregated in the parenchyma of the parietes. Their orifices are plainly visible, thickly studding the whole internal surface of the organ; and during active digestion the mucous membrane is covered with their thick, glairy, viscid secretion.

The fully distended gigerium occupies about three-fourths of the abdominal cavity. It reaches within an inch of the rectum, inclining towards the left

side of the abdomen, with the internal parietes of which it is in close approximation. The intestines all seem crowded backwards, downwards and to the right. There is no apparent constriction between the proventriculus and gigerium; but from the termination of the œsophagus proper the calibre of the canal regularly increases, so that the two stomachs together form a pyriform mass, its large end directed backward. The walls of the gigerium are thin; the mucous membrane quite smooth. The pylorus is nearly circular in shape; i's aperture quite open and direct. It is guarded by elevated folds of mucous membrane, forming partial valves. The opening is situated about the middle of the right side of the gizzard.

The duodenal fold is between three and four inches in length. It curves around the right side and fundus of the gizzard, separating the latter from the rectum, and thence returns upon itself to its point of departure.

The intestine then curves around the dorsal aspect of the gizzard until near the median line of the body, whence it descends nearly in a straight line, in the right iliac fossa, almost as far as the rectum. After numerous short convolutions in this region, it again ascends, on the right of the spine, till it regains the dorsal aspect of the gizzard near the origin of the duodenal fold. It then traverses the gizzard from right to left, and descends in the left iliac fossa, half way to the rectum, when abruptly returning on itself along the left side of the spine, it forms a loop about an inch long. Here, after again abruptly reversing its direction so as to point directly backwards, it terminates, at the cœca, in the colon.

There are two cœca, each about one-eighth of an inch long, very small, perfectly straight, obtusely rounded at their extremities, and closely adherent by cellular tissue to the walls of the colon.

The colon is very short, being less than two inches in length. It is a perfectly straight tube, running directly backwards along the median line of the sacrum. Its diameter does not exceed the average of the "small" intestines, and is less, in fact, than that of the duodenum. Between the ischia it expands into a large, nearly globular, though somewat pyriform rectum, about an inch in length. A spincter partially guards the recto-colal passage.

The pancreas in the specimens examined was not, as usual, slender and elongated, and received in the fold of the duodenum; but was short, thick and obtuse, and closely applied to the right side of the gizzard.

The spleen measures a third of an inch in length, and is of a flattened, ovoid shape, and dull reddish purple color. It rests on the dorsum of the gizzard, a little to the right, and high up near the proventriculus.

The liver is large, and its two lobes are of about equal size. They lie one on each side of the abdomen, their commissure being directly on the median line of the body. Their superior concave surfaces combined are in apposition with the gizzard and intestines; their convex inferior surfaces are accurately moulded to the thoracic parietes. Anteriorly they diverge to receive the apex of the heart between them; posteriorly they are in close mutual apposition.

The total length of the alimentary canal from pylorus to anus is about 40 inches.

19. Archibuteo lagopus (Brünn.) Gray.

Rare. A single specimen taken in winter. None others met with.

(20.) Elanus leucurus (Vieill.) Savigny.

The known range of this Hawk includes Arizona: though I am not aware that any examples have actually been brought from the Territory.

(21.) Nauclerus furcatus (L.) Vig.

I have been on several occasions assured of the existence of this Kite in Arizona, by reliable if unscientific observers. I have myself never seen it.

Numerous facts regarding the geographical distribution of this species in-

dicate that it is one of several, which, as noted by Mr. Cassin, (B. N. A., p. 37,) range much further north in the western than in the eastern portions of the continent. I have met with it as high up as Fort Leavenworth, on the Missouri River.

(22.) Ictinia Mississippiensis (Wils.) Gray.
As a bird of New Mexico, this species is doubtless to be detected in south eastern Arizona.
It is probable that the *Asturina nitida* remains to be discovered near the Sonoran border.

23. Circus hudsonicus (Linn.) Vieill.
An abundant species throughout the Territory, chiefly in its more watered portions.

24. Haliætus leucocephalus (L.) Savigny.
Bald Eagles were frequently observed at different seasons in the vicinity of Fort Whipple.

25. Aquila canadensis (Linn.) Cassin.
Rare; but occasionally observed at different seasons: warranting the belief that it is a permanent resident of the mountains around Fort Whipple.

(26.) Pandion Carolinensis (Gm.) Bonap.
Observed on the Colorado River.

(27.) Polyborus Audubonii Cass.
P. Audubonii, Cassin, Pr. A. N. S. Ph. 1865, p. 2, which see for synonymy and specific characters.
Apparently not a rare bird of the southern and western portions of the Territory. "Rio Gila and Colorado, near Fort Yuma; abundant;" *Heermann*.

(28.) Craxirex unicinctus (Temm.) Cass.
Taken by Kennerly and Möllhausen on the Colorado River. (See P. R. R. Survey, Vol. x. pt. iv. p. 20.) Probably a permanent resident of southern Arizona.

[Note.—The following extract from my Journal may be of interest: "Camp on San Francisco River, near mountains of same name, July 13, 1865. A pair of exceedingly large rapacious birds sailed over camp this evening. Their flight was easy, graceful, firm, and sustained for a long time with no visible motion of the wings, which latter were exceedingly long, pointed and acutely angulated at the carpal joint. In size they about equalled Bald Eagles; but the shape of the wings and mode of flight were very different and intimately resembled those of the Turkey Vultures. The entire under parts of these birds were *pure white*; their upper parts were not visible." I could not procure a specimen, nor can I now refer the birds to any species known to me, unless, possibly, they were the *Sarcoramphus papa*; a species which may be included hereafter in our Fauna, though its presence within our limits has not yet been positively substantiated.]

STRIGIDÆ.

29. Strix pratincola Bonap.
Common. Resident. One of the most abundant Owls of the Territory. I have frequently observed it at midday; on one occasion it was preying upon Black-birds in the middle of a small open reed swamp.

30. Bubo virginianus (Gm.) Bonap.
Common; resident. My specimens incline towards Mr. Cassin's variety *pacificus*; which was also taken on the Colorado Chiquito, by Dr. Kennerly.

31. Scops McCalli Cassin.
Taken at Fort Mojave by Dr. Cooper, who thinks it is scarcely distinct from

S. asio. The latter species is doubtless distributed throughout the Territory. I have not personally met with it. Dr. Kennerly procured *McCalli* on the Colorado Chiquito River. It is therefore to be enumerated among the Whipple birds.

32. OTUS WILSONIANUS (Lesson.)
Sparsely distributed throughout the Territory. Colorado Chiquito, *Kennerly.*

33. BRACHYOTUS CASSINI Brewer.
Common throughout the Territory. I saw a surprising number on different occasions along the Colorado River, in the day time.

34. NYCTALE ACADICA (Gm.) Bonap.
The known range of this little Owl includes Arizona; though I have not seen specimens from within the limits of the Territory.

In addition to the preceding *Strigidæ* a species of *Athene* occurs in Arizona; but whether *hypogea* or *cunicularia* I cannot now determine positively. The *Syrnium occidentale* Xantus, (Pr. A. N. S., Ph. 1859, type from Fort Tejon) will very probably be found in the Colorado Valley. Dr. Cooper has obtained *Nyctale albifrons* on the Sierra Nevada of California, which causes Arizona to fall within its now known range.

35. GLAUCIDIUM GNOMA Wagler.
Glaucidium gnoma, Wagler, Isis v Oken, xxv. 1832, p. 275. (Mexico.)
Cassin, in Baird, B. N. A., 1858, p. 62. (Oregon, Cal. etc.)
"*Strix passerinoides* Temm." Audubon, Orn. Biog. v. p. 271, pl. 432, fig. 4, 5; (not the original species as descr. and fig. by Temm. Planches Color. No. 344, which is South American, and probably the same as *S. infuscata* Temm.)
"*Surnia passerinoides* Temm." Audubon, B. N. A., 8vo. ed. i. p. 117, pl. 30.
Glaucidium infuscatum, Cassin, Birds Cal. and Texas, 1853, i. p. 139. (Name from *Strix infuscata* Temm., Man. Orn. 1820, i. p. 97; which is S. Amer. species, probably the same as *passerinoides* Temm.)
Glaucidium californicum, Sclater. P. Z. S., 1857, p. 4; in text; proposing name if N. Am. species is not true *gnoma* Wagl.

My numerous specimens present no material discrepancies from Wagler's original description in the Isis. I think it far best, with our present information on the subject, to refer the Oregonian, Californian and Arizonian bird to this species of Wagler, as Mr. Cassin has done. Should the Mexican bird ever be found to differ from the North American, the latter is to be called *G. californicum* after Sclater, as above quoted.

My citations of Audubon's and Cassin's works, (ut supra) all refer to the North American bird, though these authors erred in applying to it either of the names *infuscatum* or *passerinoides*, both of which refer to South American species, in all probability identical with each other, and quite distinct from our bird. Mr. Cassin himself corrects his error in the "Birds of North America;" and with this gentleman's later views of the synonymy I entirely agree.

The sexes of this little Owl differ much in size. A male before me measures only 5·50 × 14·50, but the tail feathers are quite imperfect; had they grown out fully the bird's length would have been about 7.00. The female is larger, measuring 7·50 × 15·25. The male is rather darker colored than the female: the spots above more numerous and smaller; the imperfect nuchal collar of black and white much better defined than in the other sex, where it is almost obsolete. In both sexes the iris is bright yellow; the mouth light purplish flesh; the bill, cere and feet light greenish yellow; the soles chrome yellow; the claws black.

A diurnal and crepuscular rather than a nocturnal species. The stomachs of those individuals examined, contained the remains of orthopterous and coleopterous insects. A permanent resident at Fort Whipple, but not very abundant.

MICRATHENE Coues, nov. gen.

Generic Characters.—Bill small and weak, compressed at the base, where it is densely covered with recurved feathers terminating in stiff bristles; outline of culmen and gonys moderately convex; lower mandible obsoletely notched. Facial disk not conspicuously defined, imperfect behind the eye. Wings exceedingly long; measuring from the carpal joint rather more than two-thirds the total length of the body; much rounded, the exposed portion of the first primary only two-thirds that of the longest one; third and fourth longest, fifth but little shorter, second about equal to the sixth. Tail of moderate length, not graduated; rectrices broad to their very tips. Tarsi of moderate length, feathered only for a short distance below the tibio-tarsal joint; the rest of their extent, and the superior surface of the toes, clothed with bristly hairs. Claws unusually small and weak, moderately curved; the outer one reaching a little beyond the base of the middle one; the inner intermediate between outer and middle ones. Middle toe and claw about as long as the tarsus. Hallux elongated. Of small size, being among the most diminutive of known Owls.

TYPE. *Athene Whitneyi*, Cooper.

With the size and general aspect of *Glaucidium*, this genus differs greatly from it as follows: The bill is smaller, weaker, less strongly hooked and dentulated. The wings are much longer, and the tail much shorter. The tarsus is unfeathered except for a short space superiorly. The claws are so small and weak as to be hardly more than insessorial rather than raptorial in character. The proportions of the tarsus and toes differ decidedly. Nor has it much in common with *Athene*, except the partially denuded tarsi; the relative proportions of the tarsus and toes to each other being quite different in the two genera; *Athene* having the middle toe and claw about two-thirds the tarsus, instead of fully as long. The claws of *Athene* are very long, acute and little curved. While both genera are very long winged, there is a decided difference in the shape of the wing; that of *Athene* being much the most pointed, in consequence of the greater elongation of the first and second primaries. I think it more than probable that *Micrathene* is a truly arboreal genus, like *Glaucidium*, thus differing radically in its habits from the species of *Athene*.

In conversation with me Dr. Cooper intimated his belief that the bird was not a true *Athene*; and my critical examination of his type, made at his own request, amply confirms the accuracy of his opinion.

(36.) MICRATHENE WHITNEYI (Cooper.)

Athene Whitneyi, Cooper, Pr. Cala. Acad. Nat. Sci., 1861, p. 118.

For the discovery of this delicate raptorial gem we are indebted to the indefatigable Dr. J. G. Cooper, so long and well known as an excellent naturalist, who procured the only known specimen at Fort Mojave, April 26, 1861. It is unnecessary to add anything to the accurate description above cited. It is one of the most interesting of the recent additions to our western Avifauna.

CUCULIDÆ.

37. GEOCOCCYX CALIFORNIANUS (Less.) Baird.

Rare and seen on but few occasions at Fort Whipple, which is near its northern and eastern limits, though specimens have been taken as far north as the Colorado Chiquito River, by Dr. Kennerly. Very abundant in the more southern and western portions of the Territory. Known as the "Chap-

arral Cock," "Road runner" and "Snake killer," to the whites; by the Mexicans called "Paisano;" marvellous stories of its powers of killing rattlesnakes and other Ophidians pass current.

Dr. Cooper has found *Coccygus Americanus* in Southern California, and thinks it is yet to be detected in the valley of the Colorado.

PICIDÆ.

38. PICUS HARRISII Audubon.

One of the most common and characteristic birds in the vicinity of Fort Whipple.

The iris is brown at all ages; but varies from a clear light reddish brown to a dark blackish brown. The bill and feet are horn-bluish black. The specimens from the same locality hardly vary notably in size, though the male is usually larger than the female. None of my specimens approach in size the immense race found in Arctic America.

No specimens out of a very large series, exhibit the slightest tendency towards the smoky brown tinge, or discoloration of the under parts, seen almost constantly in birds from California and Oregon and Washington Territories; but have the under parts pure white, and usually, too, with no indications of the obsolete lateral and crissal black streaks seen in the race from the Pacific coast. Specimens not in high plumage frequently have the primaries and rectrices gray instead of black; and this gray is sometimes so faded towards the apices of the feathers, as to be almost white.

It is a little singular that in a locality where *P. Harrisii* is resident, and so very common, *P. Gairdneri* should be either not found at all, or so very rare that I did not identify it with certainty during my whole stay; though I am under the impression that I once saw a single specimen.

39. PICUS SCALARIS Wagler.

Picus scalaris, Wagler, Isis, 1829, v. 511. Bp. C. A. 1850, p. 138. Baird, B. N. A., 1858, p. 94; but not of Gambel, which is *P. nuttalli*.

Picus gracilis, Lesson. Revue Zoolog. 1839, p. 90.

Picus parvus, Cabot, Bost. Journ. N. H., 1845, p. 90.

Fort Whipple appears to be about the northern limit of this species. It is not very common there, being only a summer visitant, breeding sparingly; further south, through the Territory and in the Colorado Valley, it is abundant. It does not appear to cross the Colorado Desert into California, (where the *P. Nuttalli* replaces it,) but extends far southward into Central America.

A male shot June 5th has the feathers worn off the belly, as if incubating. Young birds just fledged were taken July 10th. The nest was in the top of a live-oak tree. The heads of the young at this season have rather more red on them than those of the adults.

Iris deep reddish brown; bill dark slaty black; legs and feet horn bluish. The average length is 6·50 inches; some specimens measure nearly 7 inches.

P. Nuttalli seems to be exclusively a coast species, not crossing to the Colorado Valley.

SPHYRAPICUS Baird, 1858.

The genus *Sphyrapicus* instituted by Prof. Baird, in 1858, to replace the preoccupied and therefore untenable *Palumnus* of Bonaparte, (type *P. thyroideus* Cass.) is a most natural one, widely separated from other genera by singular anatomical peculiarities as well as striking external features. Its North American components are all very closely allied, notwithstanding that Prof. Baird intimates his doubts as to the propriety of referring *P. Williamsoni* here, and Prof. Reichenbach has been inclined to consider *P. thyroideus* as a *Colaptes*. I am familiar with the habits and anatomical peculiarities of all our North American *Sphyrapici* except *S. ruber*, and my study has revealed points so essentially at variance with other *Picidæ*, that I am inclined to institute for the reception of the genus a subfamily *Sphyrapicinæ*.

[March,

The genus in question is a xylophagous rather than an insectivorous one. I do not mean that the *Sphyrapici* never eat insects, for coleoptera and their larvæ may often be found in their stomachs. But their main sustenance is the cambrium, or soft, inner, *live* bark of trees, the succulent juices of which they appropriate to their œconomy, rejecting the ligneous, unnutrious fibres in the ordinary method. They are, in fact, true "Sap-suckers," and it is their devastations upon fruit and ornamental trees which have brought the family of woodpeckers into such disrepute among agriculturalists; a class not ordinarily observant enough to discriminate between these birds and the harmless or rather beneficial species of *Picus Melanerpes*, *Centurus*, etc Instead of simply "tapping" trees,—generally their decayed or dead portions too,—to extract the injurious beetles and their larvæ lurking within, the Sphyrapicines denude live branches of their bark, often for an area of several square inches at a time. I have before me specimens of wood thus attacked, from which the bark has been removed from large irregularly shaped spaces; and the result, as might be expected, is exceedingly different from that produced from the simple drilling of little holes by the insectivorous genera. Besides the cambrium, all the species, particularly in the fall, feed extensively upon ripe fruits and berries of all sorts.

The anatomical peculiarities which produce this remarkable difference in habits are very striking, and involve to a greater or less extent the whole lingual, salivary and gastric apparatus. In the tongue itself, however, and its bones, the most remarkable differences are to be seen. The tongue cannot be protruded, as a dart, far beyond the tip of the bill; the amount of extension it is capable of not exceeding a fourth or a third of an inch. This is caused by the great abbreviation of the apo-hyal and cerato-hyal elements of the hyoid bone, which do not reach backwards much beyond the tympano-maxillary articulation, instead, as in *Picus*, *Colaptes*, etc, of being produced so far as to extend over the occiput to the top of the cranium, or even to curve around the orbit of the eye in an osseous groove formed for their reception. The basi-hyals which support the tongue are also shorter and somewhat differently shaped. The tongue itself is short and flattened, with a superior longitudinal median groove, and a corresponding inferior ridge. Its tip is broad and flattened, and obtusely rounded, and provided with numerous long and soft bristly hairs. All these features are quite diverse from the long, protrudable, subulate, acutely pointed tongue of *Picus*, etc., armed near its tip with a few strong, sharp, short, recurved barbs.

The muscular apparatus for the movements of the tongue differs, of course, in a degree corresponding to these modifications of the hyoid bone. I am inclined to believe, though I have not prosecuted my dissections far enough to speak positively, that there exist differences in the salivary glands, and, perhaps, in the gastric mucous membrane, rendered necessary by the radical diversity of the ingesta.

My attention was first called to these interesting points by a communication from Dr. P. R. Hoy, of Wisconsin, in one of the newspaper periodicals of that State; which I believe was the first published notice of these facts, and that gentleman's observations I have amply confirmed by my own scalpel and field studies.

It is unnecessary to detail the external characters of this genus, as they have already been given in ample detail by Prof. Baird.

40. SPHYRAPICUS NUCHALIS Baird.

S. nuchalis Baird, B. N. A. 1858, p. 103, in text under *S. varius*. Op. cit. App. H. p. 921. (New Mexico.)

Permanent resident. Abundant.

In the adult spring male the whole chin, throat and jugulum are bright red; this color extending on the sides of the lower mandible so as to interrupt the black lateral stripe of the jugulum, which in *varius* continuously borders the

red, and invading to a considerable distance the pectoral spot of pure, deep, glossy, greenish black. In the adult female the chin is white, bordered posteriorly by a somewhat semilunar patch of red, not so intense in tint as that of the male, nor so broad. The pectoral black spot, though rather smaller, is equally pure in color. Both sexes invariably have the red crescentic nuchal collar, separated from the red pileum by a distinct line of black. Autumnal birds have the white portions of the upper parts and the belly more or less strongly tinged with lemon yellow, especially noticeable on the abdomen. Birds of the year hardly differ from the adults, except that the pectoral spot is only indicated by a few isolated black feathers scattered through a dull grey area. The nuchal collar is always observable, though its continuity may not be perfect. Independently of age, sex or season, there are great variations in the size and shape of the bill to be observed in large series from different localities.

This is to be considered as a thoroughly established species. In an immense series of skins of both species before me from all parts of North America, there is not one which cannot unhesitatingly be referred to one or the other species.

41. SPHYRAPICUS WILLIAMSONI (Newb.) Baird.

Picus Williamsoni, Newberry, 1857, (Oregon.) *Melanerpes rubrigularis*, Sclater, 1858, (California.) *Sphyrapicus Williamsoni*, Baird, 1858.

Resident. Not uncommon. Exclusively pinicoline in the regions where I have observed it. Ranges from both slopes of the Rocky Mountains to the Pacific, from as far north at least as Oregon. Fort Whipple is probably near its southern limit.

(No. 844, Oct. 13, 1864. ♂.) Length 9·5; extent 16·75. Iris dark brown. Mouth pinkish flesh color. Bill bluish black. Feet dull greenish black. Claws black.

This species exhibits the anatomical peculiarities noticed under head of the genus *Sphyrapicus*, and its habits are entirely correspondent.

42. SPHYRAPICUS THYROIDEUS (Cass.) Baird.

Resident. Very rare. Chiefly pinicoline.

The range of this species is now known to include both slopes of the Rocky Mountains, from Oregon to the Rio Grande, and probably it extends through Arizona to the Sonoran border.

Some male specimens have the grey chin more or less suffused with reddish, forming a mental spot something like that of *Williamsoni*. Neither sex appears to have any red about the crown or nape, a very unusual fact if such be invariably the case.

This species is strictly congeneric with *Sphyrapicus varius* in anatomical peculiarities and in habits, and has nothing in common with *Colaptes* beyond some similarity in the pattern of coloration.

Sphyrapicus ruber, as a bird of the whole Pacific Slope of the Rocky Mountains, will most probably be hereafter detected. It seems chiefly, however, a coast species. The *Hylatomus pileatus* is undoubtedly an inhabitant of Arizona.

43. CENTURUS UROPYGIALIS Baird.

Rare, and perhaps accidental in the immediate vicinity of Fort Whipple. A common bird of the Gila and Lower Colorado River valleys. "Abundant at Fort Mojave," (*Cooper.*) A species remarkable for inhabiting the Giant Cactuses, (*Lepidocereus giganteus* and *L. Thurberi*, of Englemann,) whence is derived its provincial name of "Suwarrow" or "Saguaro." Its plumage is often found stained with the juices of these plants. It feeds upon their fruit, but catches insects as well. The female is similar to the male, except that she wants the quadrate patch of red on the crown. The absence of the

yellow nuchal crescent, and of the yellow at the base of the bill are some of the features that distinguish both sexes from the *C. flaviventris*.

44. MELANERPES FORMICIVORUS (Sw.) Bp.

Exceedingly abundant, being the commonest Woodpecker, not even excepting *P. Harrisii*. Resident. Found in all situations.

The tongue of this Woodpecker is rather brushed at the tip, like that of a *Sphyrapicus*, than barbed, as in *Picus*, etc. Still it is exceedingly protrudable, the hyoid bone being well developed.

This species presents variations in the color of the iris rarely equalled. In a great many individuals the iris is pure white, and so it is usually described. But this is not the color in even a majority of instances, for this white is tinged with various colors,—red, blue, yellow or brown. A greater or less admixture of red gives every shade from a clear rose pink to the most delicate creamy white, and these tints are usual in adult spring birds of both sexes. Varying degrees of yellowish or ochraceous are by no means rare. Young birds are rarely found with pure white irides, for the color is usually obscured by a greater or less amount of blue or grey, producing a bluish grey or a "milk white" tint. Rarely an individual is found with dark brown irides. The latter seems to be purely accidental; the admixture of blue to denote immaturity, and the reddish tinge to indicate high spring maturity, in each case quite independently of sex.

The moult, which commences in July, continues for an unusually long period,—until November,—at least in some instances.

Adult birds are very constant both in size and plumage, but, at the same time there is an immense variation in the length and stoutness of the bill in different individuals. The black of the breast, and the lemon yellow on the jugulum have often a few isolated red feathers among them. Some few specimens have white tips and inner borders of the secondaries, but this is unusual. The pileum of young birds has often a bronzy tint, not seen in the adult.

ASYNDESMUS Coues, nov. gen.

Generic Characters.—Bill as long as the head, rather longer than the tarsus, as high as broad at the base, terminally compressed, somewhat decurved; almost colaptine in general aspect. Culmen much curved, tips of bill acute, gonys straight, lateral outline of bill decidedly concave, lateral bevelling scarcely appreciable. lateral ridge distinct, superior and inferior ridges but slightly developed. Wings very long, when folded reaching to near the end of the long tail; fourth quill longest, third and fifth about equal to each other and shorter than the second. Inner anterior claw reaching but little beyond the base of the outer claw. Feathers of the under parts and of a nuchal collar with the fibres on their terminal portion disconnected, loosened, enlarged in calibre, stiffened, almost bristle-like, with a peculiar glistening silicious hardness, destitute of fibrillæ whereby to interlock. Dorsal plumage imbricated, with an intense metallic lustre.

TYPE. *Picus torquatus* Wilson.

The bill of this genus is quite peculiar, approaching that of *Colaptes* in its length, convexity of culmen, acute tip, and slightly bevelled sides; and resembling that of *Melanerpes* in its sharply defined lateral ridge. The nasal plumuli are long and bristly but not dense. The length of the wing is excessive, and the proportions of the primaries peculiar. The most essential feature is found in the unusual texture of the feathers of the under parts and nuchal collar, which has thus been described: "The fibres of the feathers are longer than usual and remarkably stiff. Those on the terminal third of each feather are of the usual character at the base, or provided with fibrillæ, those of opposite sides interlocking as in feathers generally. The terminal portion, however, of the stem of the fibre is much enlarged and expanded

laterally to twice or more the diameter at the root, and converted into quite a stiff bristle, nearly smooth or with slight indications in place of fibrillæ. It is this portion of the feather that is colored," [BAIRD.] The feathers of the nuchal collar also posses these peculiarities. The dorsal plumage is intensely lustrous. The red about the face has a peculiar velvety aspect.

I do not find any name already proposed for this genus, which seems eminently worthy of separation from *Melanerpes*. I had long been of this opinion from examination of skins alone; and since studying the bird in the field, have become quite convinced. My name has reference to the disconnection of the fibres of the feather.

45. ASYNDESMUS TORQUATUS (Wils.)

Picus torquatus Wilson. *Melanerpes torquatas* Bonap. et Auct. *Asyndesmus torquatus* Cones. *Picus montanus* Ord. *P. Lewisii* Drapiez.

Common: resident.

In young birds there is hardly a trace of a nuchal collar, and the upper parts, especially about the head, have very little lustre. The crimson forehead and lores are very illy defined; nor are they trenchantly divided from the hoary of the breast by a black area. The blood-red of the under parts only shows in isolated patches, except perhaps on the abdomen, where it is more or less continuous; the color being of various shades of gray on the breast and sides. The feathers hardly acquire their peculiar character until old enough to have their proper color.

46. COLAPTES MEXICANUS Swainson.

Resident; abundant: found in all situations, and in habits is quite a counterpart of the eastern species it represents in Western North America.

(47.) COLAPTES CHRYSOIDES Malh.

Geopicus (Colaptes) chrysoides, Malherbe, Rev. et Mag. N. H. iv. 1852, 553. Monog. *Picidæ*, ii. p. 262.

Colaptes chrysoides, Baird, B. N. A. 1858, p. 125.

Colaptes Ayresii, Heermann, Parke's Exped. 32° parallel, in the P. R. R. Surv. vol. x. pt. ii. p. 50. Not of Audubon.

This species has been shot at Fort Mojave by Dr. J. G. Cooper, in Feb. 1861, when it was feeding on the larvæ of insects among the *Populus moniliferus*. He found it very shy and wary as all the *Colaptes* seem to be. It doubtless winters in the Colorado valley, though I do not think it leaves the valley to the north and east, as I have never found it among the Whipple mountains.

"*Geopicus chrysoides* Malh." was given by Prof. Baird in 1858 as a synonym, with a query, of his *C. hyridus*. At that time there was not sufficient material available to decide the point; but the impropriety of the reference has since become evident.* The bird is now well known as a common species of Lower and Southern California, and of the Colorado valley, and has been brought from the Sonora line. Very numerous examples are in the Smithsonian from Cape St. Lucas.

"Colaptes Ayresii Aud." of Dr. Heermann's Report, as above cited, is undoubtedly the present species. But the true *Ayresii* of Audubon is a mixture of *auratus* and *mexicanus*, more recently characterized by Prof. Baird as *C. hybridus*.

TROCHILIDÆ.

(48.) TROCHILUS ALEXANDRI Bourc. and Muls.

This species has been taken in the Colorado Desert so near the western boundary of the Territory as to render it exceedingly probable it is a bird of the Colorado River valley, as well as of the coast of Southern and Lower California. But I am not aware that it has actually been taken in Arizona.

* See descriptions of and remarks upon this species by S. F. Baird, in Pr. A. N. S. Ph. for November, 1859.

Dr. Cooper tells me that the nests which he found on the Mojave River were composed entirely of the soft white downy cotton of *Platanus* and *Salix*.

(49.) ATTHIS COSTÆ (Bourc.) Reich.

A species generally distributed throughout the Territory, particularly in its southern and southwestern portions. Not taken at Fort Whipple, though observed some fifty miles south. From Bill William's River, *Dr Kennerly*, in February; from Fort Mojave, *Dr. Cooper*. Doubtless winters within the limits of the Territory.

(50.) SELASPHORUS PLATYCERCUS (Sw.) Gould.

Numerous specimens seen on the summit of Whipple's Pass of the Rocky Mountains in July, feeding among clumps of wild roses. Not observed at Fort Whipple; but the range northward of this species, as now known, includes the whole of New Mexico and Arizona; and further north, at least, as far as Fort Bridger, Utah.

51. SELASPHORUS RUFUS Swains.

Very abundant at Fort Whipple, as it is elsewhere along the whole Pacific slope of the Rocky Mountains, and across their southern extensions into the Rio Grande valley. Summer resident, breeding abundantly; arrives April 10; remains until middle of September. Found in all situations, particularly meadows, open copses, ravines, etc., where flowers are most abundant.

CYPSELIDÆ.

52. PANYPTILA MELANOLEUCA Baird.

Acanthylis saxatilis, Woodh. Sitgreave's Expl. Zuñi and Col. Riv. Birds, 1863, p. 64. ("Inscription Rock," N. M.)

Cypselus melanoleucus, Baird, Pr. A. N. S. Ph. vii. 1854, p. 118. (San Francisco Mts. Ariz.) Cassin, Illust. Bds. Cal. and Texas, i. 1855, p. 248.

Panyptila melanoleuca, Baird. B. N. A. 1858, p. 141. Coues, Newton's Ibis., 1865, p. .

Rather sparingly distributed throughout the Territory; chiefly in the neighborhood of cliffs and precipices, which, I believe, it almost exclusively inhabits.

I think there can be no doubt that the bird described by Prof. Baird, as above, is the same as that briefly and somewhat incorrectly indicated by Dr. Woodhouse. While encamped at Inscription Rock, July 3, 1864, I saw great numbers of these Swifts; but, as unfortunate as Dr. W., I was unable to procure a single specimen, though many passed so near me that I could positively identify them. The chief point of discrepancy is the white rump mentioned by Dr. Woodhouse, which does not exist in Prof. Baird's specimens. But I am perfectly satisfied, in my own mind, that Dr. Woodhouse, from the imperfect observations he was only enabled to make, mistook the white patches on each side of the rump, which in life often reach nearly or quite across the uropygium till they coalesce on the median line. There is a corroboration of this view afforded by the *Tachycincta thalassina*. Observations of the latter in life gives the impression of a white rump; whereas this species has that part concolor with the back; but the large white cottony patches on the flanks are long and loose enough to meet each other on the rump. Moreover the localities whence the two supposed species come are so near as to render it unlikely there should exist two such closely allied Swifts.

From Inscription Rock* to the San Francisco Mountains, I continually met

* Inscription Rock is a huge mass of sandstone protruding from the side of a hill, with a front of great height perpendicular to the plain below; situate a days march west of Whipple's Pass of the Rocky Mountains, and rather more than that distance east of the Pueblo of Zuñi. The San Francisco Mountains are a well known locality.

with great numbers of these birds; except along the valley of the Colorado Chiquito River, where there were no suitable places for their habitation. It is preëminently a saxicoline species, and always found congregated in considerable, sometimes in immense numbers, in the vicinity of huge cliffs and piles of rocks; usually associating intimately and peacefully with several species of *Hirundinidæ*, especially *Hirundo lunifrons*. Its flight is very rapid and vigorous; similar in character to that of the common *Chætura*. Its note is an often and quickly repeated twitter, loud and shrill, quite different in tone from that of *Chætura pelasgia*. It builds upon the vertical faces of precipitous rocks.

Notwithstanding the identity of Baird's with Woodhouse's species, I do not think that the former's name, accompanied by a definite description, should give way to the brief and incorrect indication of *Acanthylis saxatilis*.

CAPRIMULGIDÆ.

53. Antrostomus Nuttalli (Aud.) Cassin.

This widely distributed species, which extends from Missouri and Kansas to the Pacific and south into Mexico, is particularly abundant throughout Arizona. At Fort Whipple it is a summer resident, arriving late in April and remaining until October. So numerous is it in some localities that around the camp-fires of the traveller a perfect chorus of their plaintive two-syllabled notes is continued all through the night, and some of the performers are usually so near that the sharp click of their mandibles which follows each cry is distinctly audible. But from the difficulty of observing them, little of their personal habits, beyond their cries, are known to us. I never saw a single bird in Arizona, though I have listened to perhaps many hundred. Their dissyllabic note is a peculiarity which well distinguishes them from *A. vociferus*.

I have been informed that the trissyllabic notes of *A. vociferus* have been heard in Arizona; but I consider the statement as very improbable.

(54.) Chordeiles Henryi Cass.

Abundant throughout the Territory. At Fort Whipple a summer resident, arriving in April and remaining until October. It is particularly numerous in August and September.

This species, if it be really one, is not larger than *C. popetue*, and it otherwise is so closely allied to the latter, as to render the separation of some specimens a matter based upon locality rather than upon differences to be found on comparison of skins. The western bird presents variations quite parallel with those of *popetue*; but nevertheless the average is much lighter colored and with more rufous about it, than usually exhibited by eastern specimens. These remarks are founded upon examination of very extensive series of both birds which have been at my disposal.

(55.) Chordeiles Texensis Lawr.

Common in the Colorado valley to even further north than the latitude of Fort Whipple; but not observed elsewhere further north than some fifty miles south of the last mentioned locality; and then only in summer. Extends from the Rio Grande valley to the Pacific. Numerous specimens are in the Smithsonian from Cape St. Lucas.

A female procured at Date Creek, June 5, 1865, differs from *C. Henryi* as follows: The wing from the carpus measures 7 inches instead of about 8; the tail 4¼ instead of 5. The throat, though the specimen is a female, is pure white; but there are no white bands on the tail, the lateral rectrices having very irregular, interrupted bands of rufous, except the middle pair, which are barred with black and mottled gray, the latter much the widest. The primaries are all basally spotted thickly on both inner and outer webs with bright rufous, which spots show a tendency to form incomplete bars. On the three first primaries is a large spot of very light rufous, placed within 2½ inches of

the point of the wing. The fork of the tail is less than a third of an inch. In neither sex of *C. Henryi* is there any rufous mottling on the primaries; and thus one conpsicuous alar spot is white in both sexes; and is moreover much nearer the bases of the primaries, being 3½ inches from the point of the wing; so that when the wing is folded the spot is anterior to the ends of the secondaries. The reverse is the case in *C. Texensis*; and these points will always separate the two species, even when small female *C. Henryi* is compared with large male *texensis*. I do not know if the female *texensis* always has a white throat.

I am unable to discuss the relationship of the *C. braziliensis* Gm., and in adopting the name *texensis* I am following Mr. Lawrence's authority altogether.

HALCYONIDÆ.

56. CERYLE ALCYON (L.) Boie.

Common summer resident. Arrives April 10th; remains until November. Generally distributed over the various streams of the Territory.

(57.) CERYLE AMERICANA (Gm.) Boie.

Observed at several points on the Colorado River between Forts Mojave and Yuma, which I believe is the first recorded instance of its occurrence in the United States elsewhere than in the valley of the Rio Grande.

COLOPTERIDÆ.

58. TYRANNUS VOCIFERANS Swains.

Abundant summer resident. Arrives third week in April; remains until latter part of Sept. Found in every sort of locality.

Adult individuals of the same sex hardly vary appreciably in size; and the colors are exceedingly constant. Males average from 9· × 16·5 to 9·25 × 16·75; females measure about 8·75 × 16. Iris brown. Bill and feet black. Mouth livid flesh color.

The young of the year in July and August differ materially from the adults. The mouth and some part of the lower mandible are bright yellow. The feet are light colored instead of black. The primaries are not attenuated near their tips. There is no trace of the red in the crown. The outer web of the exterior tail feather is barely appreciably lighter than the rest. The wing coverts are strongly margined and tipped with pale rufous; the quill feathers less conspicuously edged with yellowish white. The back is nearly pure dull brown, concolor with the head instead of being olive gray in contrast with the plumbeous head. Below the two ages are nearly alike; but the yellow is sometimes so pale as to be dull sulphury white; while the breast is rather brown than plumbeous. The chin is always conspicuously pure white.

(59.) TYRANNUS VERTICALIS Say.

A bird which in its extensive wanderings includes Arizona, though that country cannot be considered as properly a part of its habitat. Dr. Cooper has taken it at Fort Mojave, and throughout Southern California. I have never met with it at Fort Whipple, where *vociferans* is so very abundant.

60. MYIARCHUS MEXICANUS (Kaup.) Baird.

Common summer resident. Arrives third week in April; remains until middle of September. Seldom found in the pines, preferring ravines, hillsides, creek bottoms, etc. Some winter as high in the Colorado Valley as Fort Mojave. (January; *Cooper*.) Iris brown. Mouth livid flesh color. Bill and feet black. Moult through July and August.

At Fort Whipple young birds were first observed early in July. Though not mistakable for any other species, they differ notably from the adults. The head is clear brown, in tolerably strong contrast to the color of the back, which latter is lighter and duller than that of the adult. All the wing coverts are so widely edged and tipped with light rufous as to give the prevailing color

to these parts. The reddish edging of the primaries is very broad, and takes in more of the primaries, but is duller than in the adult. The tail differs most; instead of being dimidiated with clear brown and deep pure chestnut, (the outer webs and tips being of the former color,) the whole tail is light dull chestnut, more or less obscured by dusky towards the bases of the feathers; the central pair having a narrow median shaft line of this color. The under parts are quite similar to those of the adults; the yellow being fully as intense. The bill and feet are black, as in the adult; the mouth, however, is bright yellow.

The males average 8·50 × 13·25. The females are generaly fully ·50 × 1·50 shorter in these dimensions; a somewhat unusual amount of difference in this family.

61. SAYORNIS SAYUS (Bp.) Baird.

Common throughout the Territory; a summer resident at Fort Whipple. Is the first of the migratory birds in spring, arriving in March; and it also remains very late, until the middle of October. Winters in the whole Colorado Valley, and southern portions of the Territory generally. Almost exclusively frequents open plains in stunted chaparral, sage brush, etc.; and in some other points of habit differs remarkably from our other Fly-catchers.

The iris is dark brown; the bill and feet black, the mouth chiefly flesh colored. The moult is not finished until late in September.

There is an interesting parallelism in the migrations of the smaller Fly-catchers of the eastern and western coasts. Thus the present species arrives at Fort Whipple among the very first of the spring migrants, just as *S. fuscus* does in the middle districts of the Eastern States. Both likewise depart very late, some remaining through October. Next in order come various species of *Empidonax*:—in the East, *E. acadicus*, *traillii*, *flaviventris* and *minimus*; in the West, *E. pusillus*, *difficilis*, *hammondii* and *obscurus*; which correspond very nearly in their times of arrival and departure. Latest of all the *Contopi* make their appearance:—*C. virens* in the East; *C. Richardsonii* in the West.

This species does not habitually frequent cañons, rocky gorges, secluded banks of streams, etc., like its congener, *S. fuscus*; nor yet does it inhabit forests with the *Contopi* and *Empidonaces*.

(62.) SAYORNIS NIGRICANS Bonap.

A very abundant and permanent resident in the valleys of the Gila and Colorado, and more southern portions of the Territory generally. "Winters as high as Fort Mojave," (*Cooper.*) Not found at Fort Whipple, though detected a very few miles southward of that locality. On the Pacific coast it has been found considerably north of the latitude of Whipple; and will in all probability be found as at least a summer visitant to the latter place.

63. CONTOPUS PERTINAX Cab.

Contopus "borealis ex Mex." of many authors. Not *Tyrannus borealis* Sw. et Rich.

Contopus pertinax, Cab. Mus. Hein. ii. 1859, p. 72.

Very rare summer resident at Fort Whipple. A single specimen, taken Aug. 20, in good plumage, though most other Fly-catchers were in moult. The bill above was black, the lower mandible and mouth rich orange yellow. This young specimen differs from adult examples from Mexico in having more brown rather than pure dark olive in the color of the upper parts, in having the rump and upper tail coverts margined with dull ferrugineous; all the wing coverts and the secondaries broadly edged and tipped with the same, palest on the secondaries; and a wash of rufous on the under parts generally. The tail is less deeply forked.

This is a species to which are to be referred the various citations of "*borealis*" from Mexico; which latter species does not appear to include this country in its range. The differences between the two are more palpable than

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is generally the case in this group of birds. There is more of olive, and less of pure dark brown in the upper parts. The under parts are of a nearly uniform soiled dull brownish olive, only a little lighter on the throat, and somewhat tinged with yellowish on the middle of the abdomen, very different from the streaked brown breast and white throat and abdomen of *borealis*. The bill is much longer though not wider than that of *borealis*; bright yellow below. The tuft of white crissal feathers is far less conspicuous. In *pertinax* the second, third and fourth quills are about equal to each other, and longest; the first half an inch shorter than the second; intermediate in length between the fifth and sixth. In *borealis* the second quill is much the longest, the first and third about equal and ·15 of an inch shorter than the second; the fourth ·50, and the fifth ·90 of an inch shorter than the longest. A very differently shaped wing is thus produced. The tail of *pertinax* is nearly half an inch longer than that of *borealis*.

The present species is one of several Mexican and Peninsular birds which are found in upper Arizona; doubtless following the course of the Valley of the great Colorado. It is now for the first time introduced into the Fauna of the United States.

64. CONTOPUS RICHARDSONII (Swains.) Baird.

Exceedingly abundant summer resident. Arrives in spring about May 1st, the latest of the Fly-catchers, as does *C. virens* in the East. Departs third week in September. Found in all situations, but especially in open forests. Iris brown. Bill and feet black; the under mandible somewhat lighter colored. Mouth bright yellow.

The plumage of the upper parts of the young of the year is plain dull brown, with no olive tint; some of the feathers (chiefly those of the head and rump) tipped with dull rufous; which sometimes, especially on the rump, gives the main color to the part. Below the olivaceous gray of the adult is every where mixed with considerable dull ferrugineous; only the chin and middle of the belly being untinged with this color. All the wing coverts and the inner primaries are strongly edged and tipped with ferrugineous. The iris is brown; the bill above and the feet black; the lower mandible yellow except at tip; the mouth orange yellow.

In examining the very large series of skins I have collected on the Rio Grande in New Mexico, and in Arizona, together with specimens from Colorado Territory and other parts of the west, there has been made upon me an impression that there are two species. By far the majority of specimens are of the regulation *Richardsonii* type. A few others in the series and from very various and diverse localities, differ in being all over of a more decided and uniform grayish brown; with less of olive above and with no trace below of any sulphury olive on the abdomen; this part with the throat being more decidedly dull whitish than the rest of the series; and the breast more purely gray, in contrast to the lighter colored throat and abdomen. The bird may be well described as a miniature of *C. borealis*. Prof. Baird has always, to me, *verbis et literis*, indicated his decided conviction that there are two species in the collection; and we have been in the habit of designating these gray specimens as *Contopus Veliei*, after Dr. Velie, who sent the first example from the mountains of Colorado Territory. But the proportions of the birds appear the same in every specimen; and I have noticed, too, that all these gray ones are late summer or early fall birds, and I must candidly confess my inability to satisfactorily discern in the series a second species.

65. EMPIDONAX PUSILLUS (Swains.) Baird.

Moderately abundant summer resident. None of the several *Empidonaces* found at Fort Whipple are very numerous; and this is perhaps the most characteristic species. Arrives middle of April; remains through September. Several excellent and typical examples of both old and young are in my collection, which I have no difficulty in identifying by Prof. Baird's superb monograph.

Iris blackish brown. Legs and feet and upper mandible black; lower mandible dusky flesh. No. 36945, measures 5·9 × 8·7; No. 36944, 6·1 × 9·2.

A young bird in my Fort Yuma collection, (Sept. 17, 1865,) differs greatly from the adult in colors, though the proportions are accurately preserved. It is everywhere very strongly suffused with olive, becoming olivaceous yellow beneath, almost like *flaviventris* or *difficilis*. The middle of the abdomen, however, is more decidedly whitish, and the sides of the breast somewhat rufous. The bands on the wings and the edges of the primaries are very strongly tinged with ferrugineous, especially the former. The tail is margined with a duller shade of the same color, as is also the under coverts of the wing near its edge The upper mandible is black; the lower with the whole mouth bright yellow. The feet are brownish. But with this similarity of colors the shape of the bill, and the proportions of some other parts will always readily distinguish it from *flaviventris* or *difficilis*.

The *Platyrhynchus pusillus* of Swainson (Syn. Mex. Birds in Phil. Mag. May, 1827, 366,) is one of several *Tyranninæ* which Dr. Sclater finds it difficult to determine satisfactorily, (P. Z. S., 1859, p. 44.) The species is, I think, most undoubtedly the same as that subsequently described and figured by Swainson and Richardson, (F. B. A. ii. 1831, p. 144,) which Prof. Baird has shown quite conclusively to be the species now under consideration. I have elsewhere (vide infrà) shown where I think belongs *Tyrannula affinis* of Swainson's Mexican synopsis.

66. EMPIDONAX DIFFICILIS Baird.

E. difficilis Baird. B. N. A., 1858, p. 198; name proposed in text of *flaviventris* for western specimens.

Rather rare; summer resident; arrives middle of April; remains until latter part of September.

Iris brown; feet black; upper mandible black, lower light yellow.

It is somewhat difficult to distinguish this supposed species from the eastern *flaviventris*.

67. EMPIDONAX HAMMONDII (Xantus) Baird.

Rather rare summer resident. Arrives late in April; remains until third week in October.

A species readily discernible among the little North American *Empidonaces* by its diminutive bill, the deep forking of the tail, and the proportions of the primaries, independently of its peculiar shades of color. The grayish white tips of the lesser and median wing coverts are very conspicuous. The white margin of the inner primaries and secondaries are well defined; but stop abruptly before reaching the greater coverts, so that a well marked area is thus left entirely dark colored; except on a single feather, (the innermost secondary), which is margined for its whole length. Specimens hardly vary in size; not more than a fourth of an inch in length, and a little more in extent The bill is almost wholly dark colored; the under mandible being only slightly lighter in color. The legs and feet are black. The mouth at all seasons is bright yellow.

In the fall, as usual, the whole colors of young birds are tinged more or less strongly with yellowish olive; and sometimes on certain parts with pale ferrugineous. The back especially towards the rump is quite decidedly olivaceous brown; the head not so purely brown as in spring. The bands on the wing, and the margins of the primaries are tinged with rufous olive. The under parts, especially on the abdomen and flanks, are strongly olive yellow, giving somewhat the aspect of *flaviventris*; but the throat and breast remains much as in spring.

68. EMPIDONAX OBSCURUS (Swains.) Baird.

Tyrannula obscura, Swains. Syn. Mex. Phil. Mag. i. 1827, p. 367.

Empidonax Wrightii, Baird, Birds N. A., 1858, p. 200. (Provisional name, in text under *E. obscurus*.)

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Summer resident; rare. Arrives early in April: remains until October. Bill black above; bright yellow below, except at its extreme tip. Mouth yellow at all seasons. Iris brown. Subject to only very slight variations in size.

One of the most strongly marked of our *Empidonaces*. Its essential characters lie in the much elongated and very narrow bill; the long tarsi; the tail not forked, but rather the reverse; and the conspicuously contrasted white outer web of the exterior rectrices. Its colors are almost precisely those of *Hammondii*, but the proportions of the two birds are quite different.

There are several discrepancies between the present bird and the brief and unsatisfactory description of Swainson above cited, as shown by Prof. Baird, who proposes the name "*Wrightii*" in the event that the Mexican bird proves distinct from that of the United States.

[NOTE.—Dr. J. G. Cooper furnishes me with the following: "*Empidonax Traillii*. I have found this species west of the Mojave River and Cajon Pass, and at Santa Barbara, in California. It was abundant at Fort Mojave: a shy and retiring species; keeping in the willow and cotton wood copses of the river bottom." Though disliking to suppose an error of identification in so judicious a naturalist, I am of opinion that the note refers to *pusillus*, and not to *Traillii*. Still *Traillii* is found in Mexico, and may very possibly ascend the valley of the Colorado.]

MITREPHORUS Scl.

Mitrephorus, Sclater, P. Z. S., 1859, p. 44; type *M. phæocercus* Scl.

A genus founded by Dr. Sclater, as above, to receive certain small Tyrannuline forms, closely allied to *Empidonax*, but differing from that genus in the elongation of the occipital feathers, and a general fulvous or buffy suffusion which tinges all the colors of the species.

To the genus thus based upon *M. phæocercus* from Central Mexico, also belongs the *Muscicapa fulvifrons* of Giraud. A third species is one recently described by Mr. Lawrence,* from Costa Rica, as *M. aurantiiventris*, differing from *phæocercus* in being rather smaller, the rusty fulvous of the under parts much lighter, becoming bright orange yellow on the abdomen and sides, etc.

I have the pleasure of introducing this neotropical genus into the United States Ornis, upon specimens taken at Fort Whipple, of a species I shall describe as new; but which is so closely allied to *M. fulvifrons* that the two may hereafter prove to be identical.

69. MITREPHORUS PALLESCENS Coues, nov. sp.

?? *Tyrannula affinis*, Swainson,† Syn. Mex. Birds, Phil. Mag. i. 1827, p. 366.

? *Muscicapa fulvifrons*, Giraud, B. Texas, pl. 2, fig. 2, = *Empidonax fulvifrons*, Scl. P. Z. S., 1858, p. 301, = *Mitrephorus fulvifrons*, Scl. P. Z. S., 1859, p. 45, = *Empidonax rubicundus*, Cab. Mus. Hein, ii. p. 70.

Empidonax pygmæus Coues, Newton's Ibis, 1865. (MS. name mentioned in text.)

Sp. Ch.—Above plain dull grayish brown, tinged with olive, particularly on the middle of the back; the head and rump hardly appreciably thus tinged. Below very pale fulvous, most pronounced across the breast, the chin and throat being much lighter, and the abdomen almost white. No fulvous suffusion about the forehead; the dark feathers of the crown reaching to the bill; the space between eye and bill, the auriculars and sides of the head generally light brownish olive, with no trace of fulvous. Wings and tail plain

* Annals Lyc. Nat. Sci. Hist. New York, viii. Nov., 1865, p. 174.

† *T. affinis* Sw. l. c. "Olive, beneath pale fulvous; wing coverts and quills with pale margins; base of lesser quills with a blackish spot; bill small; under mandible yellow; tail divaricate."

dusky; the outer web of the external rectrices, the margins of the inner primaries, except just at their base, and the tips of greater and median coverts, dull white, with no tint of olive or ferrugineous. Iris brown; upper mandible and feet black, lower mandible and mouth bright yellow. Length 4·75; extent 7·30; wing from the carpus 2·15; tail 2·00; tarsus ·55; middle toe and claw ·45; bill above ·40.

Habitat.—Fort Whipple, Arizona. A summer resident, arriving early in May. Rare. Found in similar situations with *Empidonaces*.

I have before me but a single specimen of *Mitrephorus fulvifrons*, which, judging from the rufous in the white of the wing margins, and general "feel" of the feathers is probably an autumnal or immature bird. It was received from Mexico through the Maison Verreaux, and labelled by those gentlemen. From this specimen, my two examples, taken in May, at Fort Whipple, differ conspicuously in color; the upper parts being dull grayish brown, with hardly a tinge of olivaceous, instead of decided fulvous brownish olive; the lower parts being pale fulvous, only well marked on the breast, other portions, particularly the abdomen, being nearly white; whereas, in the specimen of *fulvifrons*, the whole under parts are very strongly fulvous, almost ferrugineous, only a little lighter on the chin and on the abdomen, which latter is rusty yellow instead of nearly white. The forehead and lores of my specimens exhibit no trace of the color which has given the other species its distinctive name.

I can, however, detect no differences whatever in size or form between the two. I consider it as quite possible that the discrepancies above indicated may prove to be only those of age or season. Still, a decided difference in color does exist, sufficient to warrant me in describing the species as distinct, for the present, at least. The range of habitat of the two is quite diverse.

No comparisons with *M. phœocercus* or *aurantiiventris* are needed.

Dr. Sclater, in instituting his species *phœocercus*, inclines to the opinion that it may be the species indicated by Swainson as *Tyrannula affinis*. (See citation and copy of Swainson's description, antea.) It is quite likely that Swainson had in view some species of *Mitrephorus*; but I think rather the present species than *phœocercus*, as the expression "beneath pale fulvous" hardly applies to the latter, in which the parts are very strongly colored indeed. However, Swainson's description is so vague and meagre, that it is hardly worth considering at all, in view of the impossibility of identifying it positively with any species.

I use another name than that under which I first mentioned the species in Newton's Ibis, as above; since the species being not smaller than *fulvifrons*, the name *pygmæus* would convey an erroneous impression regarding it.

(70.) PYROCEPHALUS MEXICANUS Sclater.

Pyrocephalus rubineus, Baird, B. N A., 1858, p. 201, (New Mexico and Arizona,) and of North American writers. Not *Muscicapa rubineus* Bodd., nor *Muscicapa coronata* Gm. Wagler, which refer to the South American species.

Pyrocephalus nanus, Woodhouse, Sitgreave's Report, 1853, p. 75. Not the true *nanus*.

Pyrocephalus mexicanus, Sclater, P. Z. S., 1859, p. 45.

Not found as far north as Whipple, among the mountains, though it extends up the valley of the Colorado to an equally high latitude. Common in the valley of the Gila and Southern Arizona generally.

Without the material for forming an opinion of my own, I follow Dr. Sclater in separating the Mexican bird from that of South America.

TURDIDÆ.

71. TURDUS (PLANESTICUS) MIGRATORIUS Linn.

Abundant; resident; a few winter, and fewer still breed; exceedingly numerous in spring and fall.

72. TURDUS (HYLOCICHLA *) NANUS Audub.

Rare; spring and autumn migrant; some breed? A few probably winter; as it certainly does at Fort Mojave, where Dr. Cooper has found it in January. A shy and retiring species, like *T. pallusii*.

73. TURDUS (HESPEROCICHLA †) NÆVIUS Gmelin.

Was obtained on the Colorado, between Forts Yuma and Mojave, by Lieut. Ives' Expedition in 1853; but this locality must be considered as exceptional.

74. MIMUS POLYGLOTTUS (L.) Boie.

Common summer resident. Arrives third week in April; remains until latter part of September. I found it more numerous on the Colorado Chiquito than among the Whipple Mountains. My specimens from the Rio Grande are quite like those from Arizona, of the variety *caudatus* Baird.

No. 1480, Adult Iris yellowish green. Bill and feet blackish. No. 392, adult. Iris ochraceous yellow. No. 560, young. Iris gray, mouth yellow, feet leaden blue, soles dirty white; bill above blackish, below chiefly dull flesh color.

75. OROSCOPTES MONTANUS (Towns.) Baird.

It is a little singular that I never saw this species about Fort Whipple, since it is so well known a bird of almost every portion of Arizona.

(76.) HARPORHYNCHUS LECONTEI (Lawr.) Bp.

On the 30th of September, 1865, I had the pleasure of procuring the second known specimen of this excessively rare and little known species. I found it on a dry, barren plain, covered chiefly with *mezquite* and several genera of *Cactaceæ*, about fifteen miles from the Colorado River, just above Fort Mojave. It was very shy and restless, fluttering hurriedly from one cactus bush to another, till at last I shot it as it fancied itself hidden among the thick fronds of a large *Yucca*. Its large strong feet admirably adapt it for a partially terrestrial life, and it spends much of its time on the ground, where it runs rapidly and easily. Its flight is swift but desultory, accompanied by continual flirting of the tail. A few days afterward I saw several more in the same place.

My specimen agrees exactly with Mr. Lawrence's type and description, and presents all those differences from *crissalis* detailed by Prof. Baird in his Birds of North America. Mr. Lawrence's type is from Fort Yuma. The species is undoubtedly an inhabitant of the whole of the valleys of the Colorado and Gila, probably not leaving these streams for mountainous regions.

(77.) HARPORHYNCHUS CRISSALIS Henry.

Colorado and Gila valleys. Not observed at Whipple. "A few keep about Fort Mojave." (*Cooper.*)

The second known specimen of *H. crissalis* is in the Smithsonian, from Fort Yuma, the original locality of *H. Lecontei*. The range of both species is doubtless quite identical; and the fact that, though thus associating, they still preserve intact their distinctive features, is a strong argument in favor of their separation. I have myself examined Dr. Henry's type specimen of *H. crissalis*, and find it sufficiently distinct from *Lecontei*, whatever may be its relations to the coast species *redivivus*.

The "? *Harporhynchus curvirostris*" mentioned by Dr. Heermann in his Report, as having been seen near Tucson, Southern Arizona, was undoubtedly either this or the preceding species.

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* *Hylocichla*, Baird, Rev. N. A. Birds, 1864, p. 12. Subgenus proposed for N. Amer. Wood Thrushes, as differing from *Turdus* proper with *musicivorus* as type, by their shorter, wider and more depressed bills, length and slenderness of the booted tarsi, etc.

† *Hesperocichla*, Baird, Rev. N. A. Birds, 1865, p. 12. Type *T. nævius* Gm.—*Turdus* of Bonaparte proves to belong to a different group.

CINCLIDÆ.

(78.) CINCLUS MEXICANUS Swainson.

The known range of this species includes Arizona.

SAXICOLIDÆ.

79. SIALIA MEXICANA Swainson.

Permanent resident. Exceedingly abundant. In its familiarity and other habits exactly replaces *S. sialis* of the east.

Specimens vary in every conceivable degree between the dullest colored young female and the high plumaged spring male. In immature plumage some examples much resemble *S. artica*; but there is always discernible a dorsal patch somewhat differently colored from the rest of the upper parts. The shade of blue differs in equally mature males, being sometimes of a purplish tint, and rarely the blue so invades and interrupts the dorsal chestnut as to render the boundaries of the latter quite undefinable.

80. SIALIA ARCTICA Swainson.

Rather uncommon. Noticed only late in the autumn and in the winter; not observed to breed at Fort Whipple, and I think it is there chiefly a winter visitant. Has been taken as far South as Fort Yuma. Audubon's figure of the female is quite incorrect. The species differs conspicuously from *mexicana* in its habits.

SYLVIIDÆ.

81. REGULUS CALENDULUS Licht.

Exceedingly abundant; migrant. In spring, from third week in March to second week in May. In autumn, from latter part of September to November. A few probably breed in the neighboring mountains. The species remains in abundance in the Colorado Valley during the winter, at least as high as Mojave.

82. REGULUS SATRAPUS Licht.

Has been taken in the Territory, though I have myself never met with it.

83. POLIOPTILA CÆRULEA (Linn.) Scl.

Culicivora mexicana Bonap. *Polioptila mexicana* Sclater. But not of Cassin, which is *melanura*.

Rare; summer resident; first individuals noticed April 25. "Winters in the Colorado Valley." *Cooper.*

84. POLIOPTILA PLUMBEA Baird.

P. plumbea, Baird, Pr. A. N. S. Ph. 1854, p. 118. Id. Birds N. A. 1858, p. 382, pl. 33, fig. i. Id. Rev. Amer. Birds, 1865, p. 74, (Arizona.)

Essentially a bird of the Southern Middle fauna, and generally distributed throughout Arizona, though no where very abundantly. Bill William's River, *Kennerly*, (original types of species;) Fort Yuma, *Ives*; Colorado Chiquito, Fort Mojave, Beale's Springs, Hassayampa Creek, near Fort Whipple, *Coues*. At the last mentioned locality it is a summer resident. "Winters in the Colorado Valley." *Cooper.*

(85.) POLIOPTILA MELANURA Lawr.

Culicivora atricapilla, Lawrence, olim. Not of Swainson, which is *leucogastra*, Maxim.

Culicivora mexicana, Cassin, not of Bonaparte or Sclater, which is true *cærulea*.

Polioptila melanura, Lawrence, nuper. Baird, B. N. A., 1858, p. 382. Id. Rev. 1865, p. 68. Heermann, P. R. R. Survey, x, pt. iv. p. 39, (Arizona.)

Chiefly a species of the Southern Middle Provinces; but extending westward

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to the Pacific, in the latitude of San Diego, California. Fort Yuma, *Ives*; Pima Villages, Southern Arizona, *Heermann*. Probably not to be found as high up as Fort Whipple, being restricted to the Gila and Lower Colorado Valleys.

MOTACILLIDÆ.

86. ANTHUS LUDOVICIANUS Licht.

Abundant. Winter resident. Arrives late in the autumn, according to weather, and remains until May. None breed in the vicinity of Fort Whipple.

DACNIDÆ.

(87.) *Certhiola flaveola* (L.) Sund.

This species, first introduced into the United States Fauna by specimens from Indian Key, Florida, has since been found abundantly at Matamoras and Brownsville, Texas, and also at Cape St. Lucas. It ranges over the intermediate ground along the Southern border of the Territory.

SYLVLICOIDÆ.

88. DENDRŒCA GRACIÆ Coues.

Dendroica Graciæ, Coues MSS., in Baird's Rev. Amer. Birds, Apr., 1865, p. 210.

Description. (Orig. No. 1293, ♂, Apr. 26, 1865, Fort Whipple.) Bill shorter than head or tarsus, about equal to the middle toe without its claw; the culmen convex, the gonys very slightly so, the commissure a little curved. Wings of ordinary length for this genus; second and third primaries about equal and longest; first and fourth about equal to each other, and but little less than the second or third. Sometimes the first four hardly differ appreciably in length. Fifth ·20 of an inch shorter than fourth. Tail of ordinary length; a little rounded, the outer lateral rectrices being a tenth of an inch less than the median pair. Tarsus a little longer than the middle toe and claw. Lateral toes short, equalling each other in length; the tips of their claws falling short of the base of the middle claw. Hind claw much longer and more curved than the others; about as long as its digit.

Adult spring plumage.—Entire upper parts ashy gray, with a tinge of bluish slate; the interscapular feathers conspicuously, and the upper tail coverts obsoletely streaked with black. A broad stripe of bright yellow passes from the nostril over the eye, changing abruptly into pure white as it passes over the posterior canthus. Edges of upper and lower eyelids yellow; that of the latter more or less confluent with a small semilunar patch of yellow just below the eye. Chin, throat and upper part of the breast broadly and uninterruptedly bright yellow, bordered on each side by streaks of black, which separate it from the slaty gray of the sides of the neck; more anteriorly a black line cutting off the infra-ocular yellow crescent from the yellow of the throat. Lores between eye and bill black, and the feathers of the crown centrally black, most so on the forehead, less so on the occiput, producing an appearance much like that of *Myiodioctes canadensis*. Lesser and median wing coverts colored like the back, greater coverts like the primaries; both median and greater conspicuously tipped with white, the former much the most broadly. Primaries dusky; the first three or four with an exceedingly narrow margin of white; the rest and the secondaries with somewhat pale edges. Tail like the wings; the outermost lateral rectrices white, except their shafts, and a very small area at the base of the inner web, and the outer web for half its length from the base; next feather similar, but the dusky area twice as large; the third has only a small, somewhat triangular spot of white near the end of the inner web. The under parts, from the termination of the trenchantly defined yellow of the breast, are white; immaculate on the centre of the abdomen; thickly streaked along the sides with large, partially

blended, black lines. The iris, bill and feet are black; the soles of the latter dirty yellow.

Young of the year. The slate gray of the upper parts is strongly tinged with olivaceous, least marked on the rump. The black streaks of the crown and interscapular region are so obsolete as to be scarcely discernible. The yellow of the head and throat has about the same extent as in the adult, but the tint is much paler, and it is not edged along the sides of the breast and neck by black streaks. The black lores are poorly defined. The white tips of the greater and median wing coverts are grayish rather than pure white. The strongly defined, black, lateral streaks of the adult are replaced by more or less obsolete and semiconfluent, brownish black ones, and the abdomen, crissum and circumanal region are rather ochraceous than pure white. The bill and feet are lighter colored. The white on the tail feathers does not differ materially from that of the adults. Between the extremes of color, as thus characterized, are to be found every gradation in amount of slatiness and olivaceous, of distinctness of the black lateral streaks, and intensity of yellow.

Variations. In a series of over twenty specimens of all ages and seasons, I find examples varying from 4·9 to 5·20 in length, and to a corresponding degree in extent of wings. The average dimension is 5·00 × 8·00 × 2·60. Individuals of the same age and season hardly vary appreciably in color; sometimes the black streaks of the crown show a tendency to become segregated on each side as a margin to the superciliary streak, leaving the centre of the crown immaculate, or the black may occupy the whole crown almost to the exclusion of the greyish slate. The yellow and white are always trenchantly separated on the breast, and a black border always divides the yellow chin from the yellow on the side of the head. The interscapular region may vary in its amount of streaking. The greater coverts are sometimes edged, as well as tipped with dull white.

Remarks. D. Graciæ is exceedingly unlike any other North American warbler. Its upper parts bear a striking resemblance to those of *Myiodioctes canadensis*. It agrees with *dominica* (= *superciliosa*) in the yellow throat, but is otherwise quite different from that species. It is closely allied to Baird's new Porto Rican species, *D. Adelaidæ*, but this latter has the yellow extended over the whole under parts, and otherwise differs materially in some points of form as well as color.

Habitat. First met with July 2, 1864, in the pine woods covering the summit of Whipple's Pass of the Rocky Mountains. I saw no more on my journey into Central Arizona, till again among pines at Fort Whipple, where it is a very common bird, being in fact as abundant as *virens* or *striata* in our eastern forests. It will doubtless be found in the forests of the San Francisco Mountains. Its range seems to include all the pine tracts of New Mexico and Arizona, from near the Valley of the Rio Grande to that of the Great Colorado. It breeds about Whipple; how far south it may go in winter into Mexico I am unable to say.

Arrives at Fort Whipple Apr. 20, and remains until third week in September. Almost exclusively pinicoline. An active, industrious, noisy species, possessing marked muscicapine habits, flying out from its perch to capture passing insects. Like many other diminutive birds, it ambitiously prefers to inhabit the tallest trees. It has several notes, one of which is the ordinary "tsip," emitted at all times by both old and young of most small insectivorous birds. Its song proper, only heard in spring, consists of two or three loud, sweet whistles, somewhat slurred, followed by several continuous notes resembling "chir-r-r" in a wiry but clear tone. This note is of much power for the size of the bird. Another song, uttered when pairing, is much like that of *Setophaga ruticilla*. The birds mate as early as May 1st, and doubtless raise two broods, as I have found newly fledged young as late as the middle of August.

[NOTE.—Just as these sheets are passing through the press, I find several examples of this species in a collection made by Mr. C. Wood, at Belize, Honduras, where it is said to be quite common. They are rather smaller than my Arizona specimens, but otherwise quite identical. It is somewhat remarkable that the species has never been detected in the regions lying between these two countries.]

89. DENDRŒCA NIGRESCENS (Towns.) Baird.

Common; chiefly spring and autumn migrant; but a few breed. Arrives about Apr. 20, remains until late in September. Chiefly pinicoline, and in other habits as well as in voice is exceedingly similar to *D. Graciæ*.

This species is by no means so peculiarly a Pacific one as has generally been supposed.

90. DENDRŒCA OCCIDENTALIS (Towns.) Baird.

Very rare. Summer resident. A single specimen of this little known species, taken early in September in thick scrub oak bushes. It measured 4·9 × 7·7. In this immature state the dusky olivaceous extends over the whole upper parts, deeply tinging the pure ash of the rump of the adults with a somewhat lighter shade of the olivaceous of the back, and extending forward on the crown nearly to the front, where it gradually lightens by becoming more and more mixed with yellow. The sides of the head are clear yellow, only slightly soiled by olivaceous, and the chin and throat are the same, fading insensibly on the breast into the dull greyish white of the under parts generally. The sides show indications of streaks, very obsolete, however, and have a slight wash of grayish olivaceous. There is no black whatever about the head or throat, and the back is only very obsoletely streaked with that color. The greater and median coverts are conspicuously tipped with white.

A suite of specimens illustrating all the changes of plumage of this species, so closely allied to *virens*, *chrysopareia*, etc., is still a great desideratum.

91. DENDRŒCA AUDUBONII (Towns.) Baird.

Exceedingly abundant; spring and autumn migrant. A few possibly breed. Some remain all winter. "Numerous at Fort Mojave in winter," (*Cooper.*) Very numerous from Apr. 20th to May 10th, and during the month of October, in which seasons the cotton-woods and willows of the creek bottoms are filled with the birds, which are also found in every other situation more or less abundantly.

Specimens in very high spring plumage have the black of the breast quite pure, and unmixed with slate in any portion of its extent, contrasting sharply with the whole width of the posterior edge of the yellow throat. The streaks on the sides and flanks are very narrow and distinctly defined. The interscapulare is very thickly streaked with black. The greater wing coverts are so broadly edged with white as to leave only a small space on their inner webs dusky. The yellow crown is intense in color, small and sharply defined, and there is much black on the front and lores. For so small a bird, the species varies much in size. Seasonal and sexual changes of plumage are quite homologous with those of *D. coronata*.

92. DENDRŒCA ÆSTIVA (Gm.) Baird.

Abundant. Summer resident, from April 25th to second week in September. Most numerous in the willow and cotton-wood copses.

93. GEOTHLYPIS TRICHAS (L.) Cob.

Trichas delafieldii! Heerman, P. R. R. Surv. x. 1859, p. 40.

Rare; summer resident. Arrives early in April; remains until October. Less common than the succeeding species.

Dr. Heerman is mistaken in supposing he saw *Trichas delafieldii* Audubon, in Arizona. This is a synomym of *Geothlypis æquinoctialis*, from South America.

94. GEOTHLYPIS MACGILLIVRAYI (Aud.) Baird.

Not abundant. Summer resident. Arrives late in April: remains till late in September. Exceedingly shy and retiring, keeping in the closest thickets, and very difficult to procure.

Specimens at all seasons and ages have the white eyelids distinguishing the species from *philadelphia*. Autumnal examples, though possessing the grayish ash throat just as in spring individuals, have the nape and crown so much washed with olivaceous as to be nearly concolor with the back. Iris brownish black. Bill black above and at tip of lower mandible, the rest of lower mandible and feet delicate flesh color. Average dimensions $5\frac{1}{2} \times 7\frac{1}{2}$.

95. HELMINTHOPHAGA CELATA (Say.) Baird.

Not detected at Fort Whipple, though doubtless to be found there in spring and fall, or possibly breeding. Fort Yuma, Sept. 17. Fort Mojave Oct. 1st. Headwaters Bill William's River, Oct. 3. Throughout the whole of the middle and western provinces of North America.

The *H. ruficapilla* though properly belonging to the eastern Province, has been recorded from Fort Tejon, California, (Baird B. N. A. 1858, appendix, p. 923,) and may very probably be hereafter detected in Arizona.

96. HELMINTHOPHAGA VIRGINIÆ Baird.

H. Virginiæ, Baird, Explanation of Plates of B. N. A. 1860, ix. pl. 79, fig. 1. Idem, Rev. Amer. Birds, 1865, p. 177.

Very rare: summer resident. A single immature individual procured August 15, 1864, making the second known specimen of this excessively rare species. The type is from Fort Burgwyn, N. M., *Dr. W. W. Anderson.*

97. HELMINTHOPHAGA LUCIÆ Cooper.

H. Luciæ, Cooper, Pr. Cal. Acad. Nat. Sc. July, 1861, p. 120, (Fort Mojave.) Baird, Rev. Amer. Birds, 1865, p. 178. Coues, Newton's Ibis, 1866. (Fort Whipple.)

This interesting little species, recently described, as above, does not seem to be very rare in northern and western Arizona; though so far as I am aware, five specimens taken by Dr. Cooper, at Fort Mojave, and three by myself at Fort Whipple, are the only ones known to exist in any collections. At Fort Whipple it is a summer resident; arriving the second or third week in April, and remaining till latter part of September. It mates from the 20th to the 30th of April: the young appear early in May. In habits I think it inclines toward the *Geothlypi* rather than to the species of the genus to which it belongs; showing a decided preference for thickets and copses rather than for high open woods; and also like the *Geothlypi*, it is an exceedingly shy and retiring species. The difficulty of observing and procuring it thus caused is doubtless the reason why it has remained so long undetected. It is in all its motions exceedingly active and restless; as much so indeed as a *Polioptila*, to which its colors bear such an intimate resemblance. The only note I have heard is a quickly and often repeated "tsip," as slender and wiry as that of a gnatcatcher. But Dr. Cooper tells me he has heard a rich and pleasing song, in the spring, the little performer being mounted on the top of some mezquite or other bush. I have never met with the nest; but I think it will be found, not on the ground, but in the crotch of a thick bush. Dr. Cooper thinks the bird does not breed in the Colorado Valley; but retires to mountainous regions, which is most probable. I have found it breeding at Whipple. Specimens measure from 4·30 to 4·60 in length, and from 7 to $7\frac{1}{2}$ in extent. The iris is black: the mouth flesh color, the legs and feet dull leaden blue. The young bird, just fledged, wants the chestnut crown of the adult, and the throat and breast are pure milk white, being without the faint ochraceous tinge that is just barely appreciable in the adult; the wing coverts are pale gray, and edged with ochraceous or pale rufous. The chestnut rump is present.

[March,

98. MYIODIOCTES PUSILLUS (Wils.) Bon.

Common. Summer resident. Arrives early in May, and remains through part of September.

99. SEIURUS NOVÆBORACENSIS (Gm.) Nutt.

The known range of this bird includes the Territory of Arizona. I have not myself detected the species.

100. ICTERIA LONGICAUDA Lawr.

Common; summer resident. Arrives April 25, leaves latter part of September. Iris black. Bill horn blue; most of lower mandible whitish. Feet leaden blue; the soles dirty white.

"I procured specimens at Fort Mojave, with tails no longer than those of eastern birds; but they were much grayer above than *viridis*, and this latter feature may be the most important distinction between the two." (*Cooper.*)

TANAGRIDÆ.

101. PYRANGA ÆSTIVA (L.) Vieill.

"Fort Mojave, Apr. 26," *Cooper.* I think I have seen this species at Whipple; but the individuals may have been of the succeeding species.

102. PYRANGA HEPATICA Swains.

P. hepatica, Swains. Phil. Mag. i. 1827, p. 438. Baird, B. N. A., 1858, p. 302.

P. azaræ, Woodhouse, Sitgreave's Expl. Zuñi and Col. Rivers, 1853, Birds, p. 82. Not of D'Orbig.

"*P. dentata*, Licht. Mus. Berol." (Sclater.).

Summer resident; not abundant. Arrives April 25. Found in very various situations.

Several specimens collected by myself on the Rio Grande, just below Albuquerque, are quite identical.

Dr. Woodhouse's type of *P. azaræ*, now in the Smithsonian, was from the San Francisco mountains, a little north of Whipple.

103. PYRANGA LUDOVICIANA (Wils.) Bonap.

Summer resident; rare. Arrives middle of April; leaves late in September. Iris brown, mouth yellow, legs and feet light blue. This species has an extensive breeding range, from at least as far north as Laramie Peak.

In high spring plumage, the head and throat become intense scarlet, deepest on the crown. The middle of the back is uninterruptedly pure black, and the rump is bright chrome, rather than gamboge yellow. The median and greater coverts, however, and the outer edges of some of the inner secondaries seem always tipped with dull yellow. The extent of red on the breast varies much. In the female, the head is merely a little more yellowish olive than the color of the back; the greater coverts and inner secondaries are tipped with white instead of yellow.

AMPELIDÆ.

104. AMPELIS GARRULUS (L.)

A winter visitant from the north, to the more northern portions of the Territory. "Fort Mojave, Jan. 10, 1861." (*Cooper.*) I have never detected it at Fort Whipple, though it is undoubtedly to be found there in winter.

PTILIOGONIDÆ.

105. PHÆNOPEPLA NITENS (Sw.) Sclat.

Summer resident; rather uncommon in the immediate vicinity of Fort Whipple. A little further south, however, it is found very abundantly, and is doubtless a permanent resident in the southern portions of the Territory. Inhabits rather open country, in preference to densely wooded regions. It is

a shy, wild and restless bird. The fact that it has a superb song, powerful and finely modulated, may give a hint as to its proper place in the series. It seems to me to have little affinity with the forms with which it is usually grouped.

106. MYIADESTES TOWNSENDI (Aud.) Cab.

Rare summer resident. This species has, like the *Phœnopepla nitens*, eminent vocal powers, producing a rich, sweet, finely-modulated song.

It is an interesting fact, taken in connection with its highly-developed lower larynx, that the young *Myiadestes* is spotted all over exactly like a young thrush. Numerous individuals which I studied several years ago differed from the adult precisely as a young *Turdus migratorius* does. Another marked Turdine character is seen in the "booted" tarsi—very different from the scutellations which obtain in *Phœnopepla*, with which *Myiadestes* is usually intimately associated in classifications. Whether *Phœnopepla* is to be grouped with the *Ampelidæ* or not, I think there is little doubt that *Myiadestes* is typical of an aberrant subfamily *Myiadestinæ*, of *Turdidæ*.

HIRUNDINIDÆ.

107. PROGNE SUBIS (Linn.) Baird.

Hirundo subis, Linn. S. N., 1758, p. 192, (10th ed.)
Progne subis, Baird, Rev. Amer. Bds., 1865, p. 274.
Hirundo purpurea, Linn., 12th ed. *Progne purp.* auct. Baird, B. N. A., 1858, p. 314.

Exceedingly abundant; summer resident. Arrives first week in April; remains till third week in September. Exclusively pinicoline; eminently gregarious; breeds in Woodpecker's holes in company with *Tachycineta thalassina*.

108. PETROCHELIDON LUNIFRONS (Say.)

Abundant throughout the Territory, wherever suitable localities for its nests are to be found. Associates freely with *Panyptila melanoleuca*, near the San Francisco mountains. Especially abundant at several points along the Colorado, where the river makes it way through precipitous cañons. Arrives at Whipple early in April; remains until September.

(109.) HIRUNDO HORREORUM Barton.

"Numbers seen migrating through Fort Mojave, May 25, 1861." (*Cooper.*) I found it one day in great numbers along the Rio Grande, near Albuquerque, but never detected it at Fort Whipple.

110. TACHYCINETA THALASSINA (Sw.) Cab.

Very abundant, being the common and characteristic swallow of the pine regions of Arizona, as *Petrochelidon lunifrons* is of the cañons, precipices, etc. Summer resident at Fort Whipple, arriving about March 20, and remaining until late in September. See remarks, antea, upon *Progne* and *Panyptila*. Iris brown, bill black, mouth yellow, feet brownish black.

111. COTYLE RIPARIA (L.) Boie.

Rare summer resident. A few observed at Fort Whipple late in April.

112. STELGIDOPTERYX ? SERRIPENNIS (Aud.) Baird.

Summer resident, breeding abundantly. Arrives late in April, and remains through the greater part of September.

Some young birds, taken early in September, differ from eastern examples in having the wing half an inch shorter; the tail a fourth of an inch less. The bills of both are quite identical, while the feet are even larger and stouter. The upper parts are of a brighter, clear brown, instead of grayish brown. The wing and tail coverts, and the outer margins of the secondaries and inner primaries are edged and tipped with dull ferrugineous. The whole

under parts as far as the abdomen have a rufescent hue. There is, as yet, no trace of the recurving and serration of the outer web of the first primary.

It is quite possible that these specimens should be referred to Dr. Sclater's *Cotyle fulvipennis*, from Mexico.

LANIIDÆ.

113. COLLYRIO BOREALIS (Vieill.) Baird.

Rare winter resident. A single specimen, taken in February. Iris brown; mouth yellowish white; bill black, except at base of lower mandible; feet black.

This is about the southernmost locality whence the species has thus far been recorded.

114. COLLYRIO EXCUBITOROIDES (Sw.) Baird.

Rare. Single and only specimen taken September 4th, 1864. The species is probably resident in this locality, though far from abundant.

VIREONIDÆ.

115. VIREO SWAINSONI Baird.

V. Swainsoni, Baird, B. N. A., 1858, p. 336; in text under *V. gilvus*; name suggested, if western species be distinct. Coues, Newton's Ibis, April, 1865, p. 164.

V. gilvus, Cooper and Suckley, Nat. Hist. of Washington Territory, 1860, p. 188.

Sp. Ch.—Size and general aspect of *V. gilvus*. Upper parts olive ash, decidedly less olivaceous than in *gilvus*; so that the back is nearly concolor with the head. Below whitish scarcely appreciably washed with yellowish, and only along the sides; the median portions of the under parts pure white. Other markings less distinctly defined than in *gilvus*. Wing more rounded; fourth primary longest; third and fifth equal to each other and nearly as long; second much shorter than the sixth; hardly exceeding the seventh. First (spurious) primary decidedly longer than in *gilvus* (·10 to ·15 of an inch.)

Habitat.—Rocky Mountains to the Pacific. Common summer resident at Fort Whipple, arriving in April and remaining until October.

Comparisons.—All the very numerous specimens of *Vireo* "gilvus" from the Pacific slope of the Rocky Mountains constantly differ from the eastern type by the quite appreciable characters expressed in the preceding diagnosis. These differences, though slight indeed, are quite tangible, and, in a group so little liable to variation as the Vireones, are very probably indicative of specific distinction.

The most notable distinction is found in the proportionate lengths of the primaries. All eastern *gilvus* that I have seen have the third quill longest, or the third, fourth and fifth about equal and longest, the second being equal to or longer than the sixth. In the present bird the fourth quill is decidedly longest; the third and fifth successively a little shorter, while the second is about equal to or but little longer than the seventh, never equalling the sixth. The spurious primary is from one to nearly two-tenths of an inch longer than in *gilvus*. In addition there is a decidedly ashy rather than olivaceous wash on the upper parts, rendering the crown and back nearly concolor; and there is less sulphury yellow on the under parts.

Whether these differences be "specific" or not it is certainly well to define them, and give to the species or race a name by which it may be recognized. Prof. Baird first called attention to these discrepancies, suggesting the name I have adopted in thus characterizing the new species.

In the discrepancies in the proportionate lengths of the quills of this species and *V. gilvus*, there is discernible a striking analogy with the distinctive characters of *Carpodacus californicus* as compared with *C. purpureus*.

In both *C. californicus* and *V. gilvus* the longest primary is advanced by one over their eastern representatives, the third and fourth being respectively longest, instead of the second and third; and in both, the first quill is abbreviated.

116. VIREO PLUMBEUS Coues, nov. sp.

Sp. Ch.—First quill spurious; second equal to or little longer than sixth; third longest: fourth and fifth successively but little shorter. Entire upper parts, including crown, sides of neck and line from below under eyelid to bill, uniform pure plumbeous or ashy gray, with no shade of olivaceous whatever, except a faint wash of this color on the extreme uropygium. Superciliary streak passing from nostrils over and around eye, including under eyelid; two conspicuous bands on wings; outer margins of all secondaries and most primaries; both margins of all rectrices except median pair; and entire under parts, pure white. Sides under the wings and inferior wing coverts faintly washed with light sulphury olivaceous. Lores blackish ash. Bill and feet bluish black; former very robust. Length 5·75 to 6·10 inches and hundredths; extent 9·75 to 10·25; wing from carpus 2·90 to 3·10; tail 2·50; bill ·45; tarsus ·65; middle toe and claw ·65; exposed portion of spurious primary ·75; a third the length of the second primary.

Habitat.—High central plains to the Pacific. Laramie Peak. Especially abundant in Northern Arizona. By far the commonest *Vireo* at Fort Whipple; a summer resident; arrives April 25; remains through September.

Description.—(No. 40,703, ♂, May 17, 1865, Fort Whipple. *Type*). The bill is large and very robust, being especially deep at the base, where it is compressed and much higher than broad. The ridge of the culmen is well defined; its outline very convex, the tip of the bill being much decurved, strongly hooked and notched. The commissure is a little curved; the gonys slightly convex and ascending. The tarsus is about as long as the middle toe and claw. The tip of the outer claw a little surpasses the base of the middle one; which point the tip of the inner claw falls a little short of. The hallux is considerably longer than its claw; and, with its claw, is about as long as the middle toe without its claw. The wings are long, reaching, when folded, a little beyond the middle of the tail. The third primary is usually longest; but the fourth and fifth are so near it that often there is no perceptible difference. The second is about as long as the sixth, or intermediate between it and the fifth. The spurious primary is a third as long as the second. The tail is moderately long; the rectrices obliquely truncated and a little pointed at their tips.

The bill is deep bluish black, the posterior half of of the lower mandible often light bluish horn, in marked contrast; the feet and claws are dusky leaden blue. The mouth is livid bluish white; the eyes reddish brown. The back is plainly plumbeous, like the head; and only for a brief space on the rump is there a faint tinge of olivaceous; the upper tail coverts, again, being like the back. A pure white streak begins at the nostril, and runs over the eye as a superciliary line; not extending, however, beyond the eye, but turning down around it at the posterior canthus, where it is continuous with the very extensively white under eyelid; this white of the under eyelid being separated at the anterior canthus from the superciliary streak by the blackish ashy lores. The white lower eyelid is separated from the white of the chin by an extension forward of the plumbeous of the side of the neck to the base of the inferior maxilla, where it merges into the dark lores. The lesser wing coverts are like the back. The median and greater are more like the primaries in color; very broadly tipped and more narrowly edged with pure white. The inner primaries and all the secondaries are edged with white, except towards the apices of the primaries, and towards their bases, where the edging is rather olivaceous than pure white. The inferior aspect of the folded wing shows a white central area, caused by the coalescence of

the quite broad, dull white inner margins of the primaries. The rectrices are very broadly edged on both their interior and exterior margins with pure white; which decreases in width on successive feathers till reduced to a minimum, or almost obsolete on the median pair. The bird is pure white below, except a faint wash of very pale sulphury olivaceous on the sides and flanks. The white of the breast is a little encroached on by an extension of a light shade of the plumbeous of the sides of the neck.

Variations.—Specimens taken in July and August, in very worn and faded plumage, have the upper parts dull grayish brown instead of clear plumbeous, the olivaceous of the rump barely appreciable, and that of the sides very faint. The white margins of the wings and tail are either entirely wanting or reduced to a minimum. The markings of the sides of the head are more indistinct. In this state of plumage, however, it cannot be malidentified; for it is even more unlike any other North American *Vireo* than when in perfect condition. Specimens vary to a moderate degree in dimensions, but the colors of equally mature specimens are remarkably constant.

Remarks.—The relationships of this species are decidedly with *V. solitarius;* sharing with that species and *flavifrons*, etc., the compact stout form, robust and short bill, etc. The coloration of the head is very similar to that of *solitarius*, but the other differences are too great to render necessary any comparison between the two. *Vireo plumbeus* is the plainest-colored species except *V. vicinior*, infrà, as well as one of the largest and stoutest species of the United States. The name is peculiarly expressive of its most striking feature.

This is the species referred to by me in Newton's Ibis for April, 1865, page 164, as "*Vireo*, most like *solitarius*."

117. VIREO VICINIOR Coues, nov. sp.

Sp. Ch.—First primary spurious; half as long as second; second very short, about equal to eighth or ninth; fourth, fifth and sixth longest; third but little shorter; the wing thus being made short and much rounded. Tail very long; as long as the wings; decidedly rounded; rectrices with rounded, not acute tips. Bill very short, but robust and deep at base. Tarsus much longer than middle toe and claw; toes all short; the outer about equalling the inner, much shorter than the middle toe without its claws. Entire upper parts with sides of head and neck dull plumbeous, gradually gaining a tinge of olivaceous towards rump. A narrow white ring around eye. No distinctly defined stripes on side of head, nor dark lores. Wing coverts, quills and rectrices very slightly, if at all, bordered with white. Below entirely pure white; a hardly appreciable tinge of the slightest possible shade of sulphury olivaceous on sides under wings. Bill and feet horn bluish black. Length 5·70; extent 8·60; wing from carpus 2·50; tail the same: exposed portion of first primary ·75; of second 1·50; bill ·36; tarsus ·70; middle toe and claw ·52; inner do. ·35; outer do. ·42.

Habitat.—Fort Whipple, Arizona. Type and only known specimen No. 1507 of my collections, (40,697 Smithsonian Register,) adult male, May 24th, 1865. Very rare; probably a summer resident, wintering in the Gila and Lower Colorado valleys, or in Sonora.

Description.—The bill is short, but quite stout, very deep at the base, where it is compressed and higher than broad; the culmen very regularly convex in outline from the base to the moderately decurved, hooked, notched tip. The wings are short and remarkably rounded, the spurious primary so long as to be half the length of the second quill; which latter equals the eighth; there is but very little difference in length between the third, fourth, fifth and sixth; the first and last named, especially the former, being a little less than the other two. The tail is very long, equalling the wing from the carpus, and somewhat graduated; the lateral rectrices being ·20 of an inch shorter than the median pair; and all are rounded at their extremities. The

tarsus is of moderate length; decidedly surpassing the middle toe and claw. The toes are all rather short. The tip of the outer claw just reaches the base of the middle. The inner toe is remarkably abbreviated, the tip of its claw falling much short of the base of the middle one.

Above, the bird is of a dull ashy or leaden gray, like *plumbeus*, but rather duller; which color on the back, and, to a less extent on the wing coverts, acquires an appreciable tinge of olivaceous, most marked on the rump. There is a narrow white ring entirely surrounding the eye, formed by the edges of the eyelids alone. The lores are not dusky, but somewhat lighter colored than the surrounding parts; and the sides of the head have no definite streaks of color. The gray of these parts fades so insensibly into the white of the chin and throat that it is impossible to appreciate a dividing line; and the same is the case with the sides of the neck and breast. Under the wings, the wash of olivaceous on the sides of the body is appreciable, but it is very faint and pale. The greater coverts are narrowly tipped, and the outer margins of some of the primaries slightly edged with whitish. There is nothing of the definite white seen in *plumbeus*, though the whitish area on the inner aspect of the wing is much the same. The outer edge of the exterior tail feather is narrowly white, but the others are plain dusky. The iris is brown; the mouth livid white; the fauces pinkish; the feet and bill dark bluish horn.

This is a most peculiar *Vireo*, totally diverse from all others of North America. The shape of the wing, character of spurious primary, length of tail and abbreviation of the inner lateral toe, give it an unusual shape. It will be noticed that the colors of the species are almost exactly those of *plumbeus*; but that in form the two birds are widely diverse. It is a smaller species than *plumbeus*, but its greatly elongated tail make the total lengths of the two nearly the same. The following antithetical diagnoses will readily separate them:—

V. plumbeus.—Wing (average) 3·00; tail 2·50. Spurious primary ·75; a third the length of the second primary; the latter intermediate between fifth and sixth. Tail about even; rectrices with obliquely truncated tips. Tarsus as long as middle toe and claw (·65). Tip of inner claw almost reaching to base of middle one. Wing coverts, quills and tail feathers broadly edged with pure white. Sides of head parti-colored, with distinctly defined stripes. Lores dusky, interrupting the broad white circumocular ring at anterior canthus.

V. vicinior.—Wing 2·50; tail fully as long. Spurious primary ·75; half the length of the second primary, which latter is intermediate between eighth and ninth. Tail decidedly graduated, the feathers with broadly rounded apices. Tarsus longer than middle toe and claw, (as ·70 to ·52). Tip of inner claw falling much short of base of middle one. Wing coverts, quills and tail feathers very narrowly, if at all, edged with dull white. Sides of head unicolor, unstreaked; the lores plain grayish white, not interrupting the continuity of the very narrow circumocular ring.

It is unnecessary to compare *vicinior* with any other species, it is so very dissimilar from them all. With but a single specimen, I cannot now give its variations, though these are doubtless parallel with those of *plumbeus*. The species must, I think, be exceedingly rare, or I should have met with others.

(118.) VIREO PUSILLUS Coues, nov. sp.

Sp. Ch.—Among the smallest of the genus, in form and general aspect resembling *V. Belli*. Above grayish ash, becoming more or less ashy olivaceous on the back; not more so on the rump than elsewhere. Below pure white, including under wing coverts; on the breast sometimes a faint suffusion of the lightest possible shade of brownish gray; sides under the wings moderately tinged with sulphur yellow. A narrow short superciliary streak; edges of eyelids, two bands on wings and narrow margins of outer border of wings

and tail, dull white; on the latter tinged with olivaceous. Bill as in *V. Belli*. Exposed portion of spurious quill about half as long as second. Fourth primary longest; third and fifth about equal to each other, and but little shorter than fourth; second about equal to eighth. Tail very long, equalling the wing; rectrices quite narrow, with acuminate tips. Tarsus long, much exceeding the short toes; outer claw surpassing, inner about equalling the middle toe without its claw. Length (approximately correct only) 5·00; extent 7·25. Wing 2·15; tail about the same. Bill ·34; tarsus ·65; middle toe and claw ·50; outer do. ·42; inner do. ·39.

Habitat—Lower and Southern California, and probably Sonora, at least as far north as near Fort Whipple. Cape St. Lucas, *Xantus*. Fort Mojave, *Cooper*. Fifty miles south of Fort Whipple, *Coues*; breeding abundantly in the last mentioned locality. Never observed at Fort Whipple.

Description.—(No. 16,954, Smiths. Register, ♂, Cape St. Lucas.) The bill is shaped exactly as in *V. Belli*, and is similarly colored; being light horn blue, the lower mandible nearly white; the former color fading into reddish brown in drying. The iris is brown, the legs and feet dull leaden blue. The color of the upper parts is a plain dull ashy gray on the head; tinged with grayish olivaceous on the rest of the upper parts; but quite unlike the olive green of *Belli*. Below the pure white of the under parts is slightly obscured by a wash of barely definable grayish brown across the breast; and a light shade of sulphury olive tinges the sides under the wings. There is no approach to the bright sulphur yellow which so strongly tinges the whole under parts of *Belli*, especially the flanks and circumanal region; and invades the under wing coverts, which in *pusillus* remain white. The markings on the sides of the head are quite identical; and the edging of the wings and tail is similar in amount and in tint. The following are the differential points in the diagnoses of the two species, comparison being made with Audubon's type specimen.

V. Belli. Spurious primary two-fifths the second primary; third longest; second a little longer than seventh. Wing much longer than tail. Color above olive green, whole under parts except the throat strongly tinged with sulphur yellow.

V. pusillus. Spurious primary half as long as the second; fourth longest; second equal to eighth. Wings and tail equal in length. Color above grayish olive. No sulphur yellow below except a slight wash along the sides under the wings.

TROGLODYTIDÆ.

(119.) CAMPYLORHYNCHUS BRUNNEICAPILLUS (Lafr.) Gray.

Valleys of the Gila and lower Colorado. Common in the southern and western portion of the Territory. Not observed at Whipple. "Exclusively a cactus Wren;" (*Cooper*.)

It is quite possible that *Campylorhynchus affinis* Xantus, from Cape St. Lucas, may be found in the vicinity of Fort Yuma.

120. SALPINCTES OBSOLETUS (Say) Cab.

Common at Whipple, though less so there than in the more southern and western portions of the Territory. Almost exclusively confined to rocky hillsides, cañons and precipitous gorges or ravines. Restless, shy and noisy; the note being a very loud and strong whistle. Arrives in spring about April 25; remains until October. The moult is severe, lasting through part of September.

(121.) CATHERPES MEXICANUS (Sw.) Baird.

Not observed at Whipple; first noticed a few miles southward from that locality; generally distributed over the southern and western portions of the Territory, as high up the Colorado at least as Fort Mojave; nowhere very

abundant. Rocky precipitous localities, cañons, etc. This species has a laughing whistle, unsurpassed for oddity as well as for power.

122. THRYOTHORUS BEWICKII (Aud.) Bonap.

Troglodytes Bewickii, Audubon, Orn. Biog. i. 1831, pl. xviii. p. 96.
Thryothorus Bewickii, Bonap. List. 1838. Baird, B. N. A. 1858, p. 363.
Troglodytes leucogaster, Gould, P. Z. S. 1836, 89. (Tamaulipas.)
Thryothorus (Thryomanes) Bewickii, var. *leucogaster*, Baird, Rev. Amer. Birds, 1864, pp. 122, 126, 127.

The most abundant and characteristic Wren of Whipple, resident all the year, and found in all situations.

The numerous specimens collected are of the var. *leucogaster*, as defined by Baird, l. c. suprà. Variety *spilurus*, Vigors, appears to be a coast type.

I have never seen the *Thryothorus Berlandieri* from Arizona; but think it probably will be hereafter detected, particularly near the New Mexican boundary of the Territory, in the southern portions of its extent. The types of the species are described from New Leon, Mexico.

123. TROGLODYTES PARKMANNI Audubon.

"*Troglodytes americanus* Aud." Heer., P. R. R. Survey, x. pt. iv. p. 41.
Troglodytes ædon, Idem, op. et loc. cit.

Very abundant; summer resident. Arrives April 20; remains until October.

Dr. Cooper informs me that so far as he knows this species never recurves the tail over the back, a habit so characteristic of *ædon*. I have myself noticed hundreds of individuals, and do not now recall an instance where this peculiar attitude was assumed. *Parkmanni* has always seemed to me to be a shyer, less familiar, more retiring and wood-loving species than its eastern representative; and though the measure of the song is the same, yet in tone and volume I have often thought it sounded a little different from the familiar trill of *ædon*. If some of these points of habit could be substantiated, they would go far towards eking out the rather slim diagnosis upon which the species now grounds its claim to recognition.

Dr. Heermann very wrongly says that "*T. americanus* Aud." is "abundant in the wooded portions of the country." We might suppose he had mistaken *Parkmanni* for this species, did he not also give *T. ædon* as being abundant too.

Troglodytes (Anorthura) hyemalis Vieill., a bird of the eastern province, has been recorded from Fort Tejon, Cala., (Baird B. N. A. p. 923,) and may probably be found in Arizona.

124. CISTOTHORUS PALUSTRIS (Wils.) Baird.

Cistothorus (Telmatodytes) palustris var. *paludicola*, Baird, Rev. Amer. Birds, 1864, p. 148.

Very abundant in a small swampy tract near Fort Whipple; and elsewhere observed in similar situations. Summer resident. Arriving early in April, and remaining until November. "Winters in the Colorado Valley, as high as Fort Mojave." (*Cooper.*) My specimens are referrible to Baird's var. *paludicola*.

CERTHIIDÆ.

125. SITTA ACULEATA Cassin.

Very common, permanent resident. Chiefly pinicoline about Fort Whipple. I have never seen a specimen out of an immense series which was not readily distinguishable from *carolinensis*.

126. SITTA PYGMÆA Vigors.

The most abundant and typical Nuthatch of all the pine regions of Arizona and New Mexico. Resident. Young appear in June. Semi-gregarious at all seasons. Seems to be exclusively pinicoline. Iris black. Bill bluish

[March,

black; bard parts of mouth livid blue, soft parts flesh colored. The color of the under parts varies greatly from a very pale fulvous, almost white, to a decided ferruginous, almost like *canadensis*. Sometimes the under parts are smoky brown, as in *Picus Harrisii* from California and Oregon.

(129.) SITTA CANADENSIS Linnæus.

Rare; perhaps only accidental. (Fort Yuma, *Ives.*) Not met with by me. Dr. Cooper never saw it at Fort Mojave.

128. CERTHIA AMERICANA Bonap.

It is a little singular that I never saw a specimen of this species in Arizona, though it is generally distributed over the Territory. Dr. Kennerly procured it very near the present site of Fort Whipple.

PARIDÆ.

129. LOPHOPHANES INORNATUS (Gamb.) Cass.

Winter resident chiefly; but some doubtless remain through the year, breeding in the neighboring mountains. Not very abundant. Emphatically an evergreen oak species, eschewing the pines, and frequenting open hillsides.

Iris black. Bill black; horn blue along its commissural edges and at base. Feet deep leaden blue.

130. LOPHOPHANES WOLLWEBERI Bonap.

Permanent resident; common, more so at least than the preceding. Usually semi-gregarious except when breeding. Found in all situations; but chiefly affect the oak thickets, and the chaparral of open hillsides. Generally distributed through the Territory, and extending southward into Sonora.

131. PŒCILE MONTANUS (Gamb.)

Resident throughout the Territory, more particularly its pine tracts. Nowhere very numerous. The only species of black-capped and throated Titmouse ascertained by me to inhabit the Territory.

The American black-capped Titmice seem to me generically distinct from Linnæus' type of *Parus;* while they are entirely congeneric with *P. palustris* of Europe, Kaup's type of *Pœcile.*

P. septentrionalis is recorded from the Southern Rocky Mountains, and may hereafter be added to the Whipple list. (Fort Massachusetts, *Dr. Peters, U. S. A.*)

(132) AURIPARUS FLAVICEPS (Sund.) Baird.

"Abundant in the Colorado Valley, where it is a permanent resident," (*Cooper.*) I do not think it leaves the valley for the mountainous portions of the Territory.

133. PSALTRIPARUS PLUMBEUS Baird.

Resident and very abundant at all seasons. Decidedly gregarious, and, except when mated, always found in "flocks" of from five or six to as many as fifty or more; active, restless and noisy, familiar and unsuspicious. Eschews pines, and keeps entirely in the thick shrubbery of the hillsides, or the denser brush of creek bottoms and ravines.

No. 752 and others; iris bright yellow. No. 753 and others; iris dark brown. This difference seems entirely accidental, and not dependent upon age, sex or season.

The original types of the species described as *Psaltria plumbea*, by Prof. Baird, are from the Colorado Chiquito River.

ALAUDIDÆ.

134. EREMOPHILA CORNUTA (Wils.) Boie.

Common; permanent resident in all situations adapted to its wants.

FRINGILLIDÆ.

135. HESPERPHONA VESPERTINA (Cooper) Bonap.

Chiefly a more northern and coast species; but extending as far south as the table lands of Mexico. It is undoubtedly a component of the Whipple Fauna, though I never succeeded in detecting it in that locality.

136. CARPODACUS CASSINI Baird.

Common; resident. A species conspicuously different from *purpureus* in habits as well as in form and color. Its range of habitat is quite diverse; and I have seen specimens taken during the breeding season, from the Table Lands of Mexico. "Extends west to the eastern slope of the Sierra Nevada." (*Cooper.*)

The difference in the tint of the red of the males, and its distribution on the under parts would alone readily distinguish it; independently of its larger size, large long bill, different proportions of primaries, etc., which latter features will always serve to separate females and immature birds.

My specimens range from 6·4 × 10·9 to 6·7 × 11·4. Iris brown; legs and feet brownish black; bill above deep horn blue, below flesh color more or less obscured by dusky. Very young birds of either sex have an ochraceous or light rufous suffusion over the whole body, most noticeable below. The streaks are more numerous and less sharply defined.

137. CARPODACUS FRONTALIS (Say) Gray.

Fringilla frontalis, Say. *Pyrrhula frontalis*, Bon. *Erythrospiza frontalis*, Aud. *Carpodacus frontalis*, Gray. Baird, B. N. A. 1858, p. 415.
Carpodacus familiaris, McCall, Pr. A. N. S. Ph. 1852, p. 61.
Carpodacus obscurus, McCall, Pr. A. N. S. Ph. 1851, p. 220.
Carpodacus "californicus"! Coues, Newton's Ibis., Apr., 1865, p. 164, (errore pessimo.)

Very abundant. Permanent resident, but most abundant in spring and fall. Eminently gregarious. Found in all situations. In spring keep mostly among thickets of *Salix* and *Populus*, on the young buds of which they chiefly feed.

The shade of red in equally adult males differs most remarkably. Immature males, in the late fall and winter months, show every possible gradation, from a plumage indistinguishable from that of the female to that of high spring condition; in which, also, the color of the throat, breast, crown and rump ranges from an intense crimson to a light rose red, almost pink; sometimes a bronzy tint is quite apparent. Young birds just from the nest differ in being much more thickly streaked below, the streaks themselves narrow and quite sharply defined, contrary to the general rule among young *Fringillidæ*. The wing coverts, secondaries and tail feathers are broadly edged with dull rufous. The crown and back are obsoletely streaked. The preceding relates to June and July birds. A common autumnal condition is to have the whole body, but particularly the under parts, washed with light rufous or ochraceous, in which the broad streaks are numerous and semiconfluent.

I have shot "Buriones" all the way from the Rio Grande, through New Mexico, Arizona and California to the Pacific coast, and cannot discover the slightest indication of another species tending toward *purpureus* or *californicus*. The latter species seems to be exclusively a coast bird.* At the same time *frontalis* is exceedingly different from the *C. hæmorrhous* of Mexico.

138. CHRYSOMITRIS (PSEUDOMITRIS) PSALTRIA (Say) Bonap.

Fringilla psaltria, Say, Long's Exp. Rocky Mts. ii. 1828, p. 40.
Fringilla (Carduelis) psaltria, Bonap. Am. Orn. i. 1825, 54, pl. 6, fig. 3.
Carduelis psaltria, Audubon's works.
Chrysomitris psaltria, Bonaparte, Comp. list, 1838. Baird, B. N. A. 1858, p. 422.

* By an unfortunate oversight, I gave "*californicus*" as the Arizona species in Newton's Ibis, as above, instead of *frontalis*, an error it is quite important to correct.

Chrysomitris (*Pseudomitris**) *psaltria*, Cassin, Pr. A. N. S., Philadelphia, 1865, p. 93.

Abundant. Summer resident. Arrives last of April, remains until middle of September. Males are in dull plumage of females in August. Decidedly gregarious in autumn. Feed almost exclusively on buds and seeds. Probably less numerous in the southern portions of the Territory.

In typical adult males the pileum is black, *but this color does not extend below the eyes;* the lores and auriculars being olive like the back. Upper parts, exclusive of the wings, *clear olivaceous*, somewhat more yellowish, and with concealed white on the rump. The back may be somewhat marked with blackish spots, though rarely to the extent represented in Audubon's plate. The wings are black, though some of the lesser and median coverts are tipped with olive. The greater coverts are so broadly tipped with white as to form a conspicuous transalar fascia, and the secondaries and inner primaries are still more broadly edged on their outer margins with white. The tail is black, the three outer rectrices white on their inner webs to within a short distance from their tips, the shafts white along the white portions of the feather. A white spot at the base of the primaries (except on the first two or three,) is partially concealed by the bastard quills. Below, with the feathers on the side of the lower mandible, yellow.

The female has no black pileum, the crown being concolor with the back. The yellow of the under parts is less pure and bright. The edgings of the wings and coverts are grayish and narrow. The white on the inner webs of the lateral rectrices is only indicated by a small, irregular, dull gray spot. The spot at the base of the primaries is small and inconspicuous.

Young birds in August are above very dull and rather ochraceous olive, not conspicuously different from the under parts. The edgings of the wings are tinged with ochraceous. The basal primary spot is very small. There is no indication of white on the rectrices.

Old males changing plumage during both the vernal and autumnal moult, have the olive of the back dull and obscured by dusky; the pileum somewhat variegated with olive. The wings and coverts have scarcely a trace of white edging. The under parts are quite brightly yellow.

Why I have thus gone into detail in characterizing this species will be evident from the succeeding article. I wish it to be noted that the diagnostic points of *psaltria*, as compared with *mexicana*, lie in the black pileum definitely bounded on all sides with olive, not descending on the sides of the head below the eye; and in the decided olive of the upper parts. The bill is conical and quite stout; the gonys straight; the culmen a little convex. The species extends over the western portion of the continent to the Pacific, and nearly, or quite, to the Sonoran border.

(139.) CHRYSOMITRIS PSEUDOMITRIS MEXICANUS (Swains.) Bonap.

[A. Var. *mexicanus* Swains.]

Carduelis mexicanus, Swainson, Syn. Mex. Birds, in Phil. Mag. i. 1827, p. 435. (Table Lands of Mexico. Real del Monte. Temiscaltipec.) Wagler, Isis von Oken, 1831, p. 525.

Chrysomitris mexicanus, Bonaparte, Consp. Av. i. 1850, p. 516. Baird, Birds N. A., 1858, p. 423.

Chrysomitris (*Pseudomitris*) *mexicana*, Cassin, Pr. A. N. S. Ph. 1865, p. 93.

Astragalinus mexicanus, Cab. Mus. Hein., 1851, p. 159.

Fringilla melanoxantha, "Licht. Mus. Berol." (Quoted by Wagler, Isis, 1831, p. 525, as a syn. of *C. mexicana* Sw.)

Fringilla texensis, Giraud, Sixteen Sp. Tex. Bds. 1841, pl. v. fig. 1. G's type examined by me. Belly not white as stated.

* *Pseudomitris*, Cass., nov. subg. ut supra. Type *Frin. psaltria*, Say. Considered as probably belonging to subfamily *Cyanospizinæ* of Sclater.

?Fringilla catotol, Gmelin. S. N. i. 1786, 914.
?Chrysomitris nana, Bp. C. A. 1850, i. p. 516, fide Baird.
?"Cocozton, Hernand. Thes. p. 52. Cap. 192." (Quoted by Wagler, l. c.)

[B. Var. *columbianus* Lafres.]

Chrysomitris columbianus, Lafresnaye, Rev. Zool. 1843, p. 292. (Central America.) Baird, Birds N. Am. 1858, p. 423.
Astragalinus columbianus, Cabanis, Mus. Hein. 1851, p. 159.
Chrysomitris (Pseudomitris) columbianus, Cass., Pr. A. N. S. Ph. 1865, p. 93.
Chrysomitris xanthogastra, Dubus, Bull. Acad. Belg. xxii. i. 1855, p. 150.

[C. Var. *arizonæ* Coues.]

Chrysomitris (Pseudomitris) mexicanus Var. *arizonæ*, Coues, MSS.

Synonymy. Swainson's description* is very brief, unsatisfactory, and inaccurate. Although the tail is not two inches long, (varying from 1·50 to 1·75,) nor has its three lateral tail feathers (wholly) white, yet the diagnosis may be accepted as indicative of the bird now well known from all portions of Mexico as *Chrysomitris mexicanus*. Wagler's fuller description is quite pertinent. Upon the latter author's authority, I quote *Fringilla melanoxantha* of Lichtenstein. It is probable that Bonaparte's *Chrysomitris nana* belongs here. I have examined Mr. Giraud's type of *Fringilla texensis*. It has not a white belly as stated, but is absolutely identical with typical Mexican examples.

The synonyms adduced under var. *columbianus* do not seem to require comment.

Description. (Ad. ♂, spring, S. I. No. 4078, Parras, Mex.) Bill a little elongated, subconical, culmen slightly convex, gonys a little concave; bluish lead color. (Sometimes yellowish at base of upper mandible.) Black of upper parts quite pure and unmixed with olive, except on the rump, where a little olive and more white may be seen on parting the feathers. The black extends on the lores, auriculars, sides of the neck, and to a less extent on sides of breast; on the cheeks, between eye and lower mandible, somewhat mixed with yellow. *The under eyelid is yellow*, separated from the yellow of the throat by some black. The basal white spot on the primaries, (exclusive of the two first,) and the white margins of the outer edges of the secondaries are well defined, but the white tips of the median coverts, which form so conspicuous a bar in *psaltria*, are much narrower. The three exterior tail feathers are almost wholly white on their inner webs to within from a fourth to a third of an inch of their tips. Below the bird is wholly yellow.

Numerous Mexican specimens hardly differ from the above, except in the amount of white edging of the wings and coverts. This is so extremely variable, that it cannot be a character of the slightest consequence. One (No. 4077, New Leon, Mex.) has some little olive mixed with the black of the back.

Another series of skins, five in number, from Panama, Costa Rica, etc., without exception differ from the Mexican type as follows:—The black on the side of the head descends much lower, in fact to the angle of the mouth, completely occupying the cheeks and auriculars, and the under eyelid shows no trace of yellow. The under parts are of a much brighter yellow, rather orange than lemon. Moreover, they average less white upon the wings and tail. In some the white spaces only occupy two rectrices instead of three, only extend to within half an inch of the tip, and are, in fact, rather small irregular blotches, than well defined large spaces.

A third series, also from Central America, presents precisely the features last detailed, but the white on the tail feathers is either entirely wanting, as in No. 1818, or reduced to a minimum as in No. 39791. This form constitutes Lafresnaye's *C. columbianus*.

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* "Glossy black, beneath yellow, base of quills and lateral tail feathers white. Total length 4½; bill 3-10; wings 2½; tail 2; tarsi ½."

Still a fourth series is recognizable in the collections before me, embracing examples from New Mexico and Arizona; collected by myself near Fort Wingate, in New Mexico, and by J. H. Clarke on the Gila River. These exhibit a remarkable gradation towards the peculiar features of *psaltria*. The black of the back is mixed with about an equal amount of olive, the proportions of the two colors varying from e. g. No. 37088, where there is only a trace of olive, to e. g. Nos. 37091—2, where there is decidedly more olive than black, so much indeed that this color forms quite a contrast with the black pileum. The auriculars are black as in *mexicanus*, but the yellow lower eyelid, like that of *psaltria*, is not disconnected with the yellow of the throat. All three of these birds I shot out of the same flock at the same time, (June 28, 1864.) The Gila birds agree exactly with the most olivaceous of these just described. A specimen No. 39094, ♂, Aug. 18, Fort Whipple,) of supposed *psaltria* with a pure olive back, has the auriculars black.

From the above detailed features of large series of skins, representing localities all the way from Panama to Northern Arizona, it will be evident that the typical style of *mexicanus* from the table lands merges, by insensible degrees, through Costa Rican examples into an extreme of form which has been designated as *C. columbianus*. In like manner, just north of Mexico where the confines of the species inosculate with those of *psaltria*, we have a race or form showing decided gradations towards the characters of the last named species. But still the typical *psaltria* is so very diverse from *mexicanus* proper, and the doubtful specimens incline so very decidedly towards the latter, that, in the impossibility of uniting *psaltria* with *mexicanus*, we must consider them as "varieties" of the latter, unless, indeed, they be hybrids between the two.*

Upon the whole, then, it may be best to refer all the black-backed examples to one species,—*mexicanus*,—recognizing three "varieties,"—*columbianus*, *mexicanus* and *arizonæ*,—as at least a convenient mode of indicating the differences, whatever be their value, which actually do exist.

Regarding the females of the two species and of the varieties, I confess my inability to distinguish them with any degree of certainty, except by the localities whence they come, since all are quite similarly colored, and there are no very tangible differences of form.

140. CHRYSOMITRIS LAWRENCEI (Cassin) Bonap.

Abundant; probably resident. My numerous examples of this species, so widely dissimilar from any other, were all taken at Fort Whipple in winter. Although I never noticed it at any other season, I have little doubt that it is a permanent resident, breeding in the mountains of Northern Arizona. I have seen summer examples from Fort Tejon, Cal. The differences between winter and spring or summer specimens, consists in little else than the replacing of the yellow dorsal spot by olive gray, either pure or a little mixed with yellowish. The yellow of the other parts is as bright as in spring, and the black frontlet remains intact. Females want entirely the black on the head, which is all around plain olive gray, while the pectoral spot and other yellow parts are dull in tint, and restricted in extent, or even, as may be the case sometimes with the dorsal spot, entirely wanting. The iris of both sexes is dark brown. In summer the bill and legs are flesh colored, more or less obscured by dusky; in winter the bill is horn blue, and the legs, feet and claws blackish brown.

The species has been hitherto considered as chiefly a California Coast bird.

141. CHRYSOMITRIS PINUS (Wils.) Bp.

A generally distributed species, undoubtedly to be hereafter added to the Whipple list. Fort Thorn, N. M., *Dr. T. C. Henry, U. S. A.*

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* "How convenient it would be if we could, with dignified imperturbability, accept a broad theory of hybridization as the correct solution of these constantly recurring and vexatious problems!"

142. CURVIROSTRA AMERICANA Wilson.

If, as is probably the case, the *Loxia mexicana* of Strickland is rightly to be referred to *C. americana*, then this species, being found breeding upon the Table Lands of Mexico, and so generally distributed throughout North America, must be added to the Arizona list. It is doubtless to be found at times at Fort Whipple.

Chrysomitris tristis, *Aegiothus linarius*, and, perhaps, *Curvirostra leucoptera* and *Pinicola canadensis*, though not to my knowledge hitherto detected in Arizona, will most probably be discovered in winter towards the northern boundary of the Territory.

143. PLECTROPHANES MELANOMUS Baird.

Resident? Rare. A single specimen taken Oct. 17, 1864, on open, grassy plains, is referrible to this species.

Some interesting peculiarities of the range of habitat of this species assist the characters presented by the bird in separating it from *P. ornatus*. It is known to breed on the Table Lands of Mexico.

(144.) PLECTROPHANES MACCOWNII Lawrence.

Extends from the vast arid plains of New Mexico into those of Southern Arizona. (*Dr. Heermann.*)

145. CALAMOSPIZA BICOLOR (Towns.) Bon.

"Abundant near the Pima Villages, A. T.," *Dr. A. L. Heermann.* This gentleman also says that he found it in the Mesilla Valley near Fort Fillmore. In crossing the Great Plains I found it abundant as far as the Raton Mountains, westward of which I have never seen it. In the north its westward range seems limited, but it extends along the Mexican border, and across the Southern Rocky Mountains and Valley of the Lower Colorado, and is found also at Cape St. Lucas. It is not recorded from the coast region of Upper California.

146. CHONDESTES GRAMMACUS (Say.) Bon.

Chiefly spring and autumn migrant, being very numerous at those seasons. Many breed, and a few remain all winter. Extends southward to Mexico. "Not detected in the Colorado Valley even in winter." (*Cooper.*)

147. PASSERCULUS ALAUDINUS Bonap.

Abundant. Summer resident. My numerous specimens are referrible to this supposed species, differing in some slight degree from the average of eastern birds in the grayish rather than decidedly yellow superciliary streak, and the general paleness of the colors. The bill is perhaps a little slenderer and more elongated. The differences which separate it from *savanna* appear to me no greater than are to be found when large series of the latter are compared with each other.

For some additional data upon the relationships of the North American *Passerculi*, see the London Ibis for 1866.

148. POOECETES GRAMINEUS (Gm.) Baird.

Very abundant. Summer resident. Winters in the Colorado Valley. Arrives last week in March. Remains till November. I can detect no differences between eastern and western birds.

149. COTURNICULUS PASSERINUS (Wils.) Bon.

Rare. Not observed at Whipple. Bill Williams' River, *Kennerly.*

150. ZONOTRICHIA GAMBELI (Nutt.) Gambel.

Abundant. Resident. First noticed Sept. 15, and at once becoming exceedingly numerous, they continued so until January; after which only a few stragglers were seen until the latter part of April, when they again became common. By far the greater part go further north to breed. In general habits this species seems to resemble *albicollis* rather than the more closely allied *leucophrys*.

Iris bright brown. Bill bright lemon yellow, dusky reddish at tip. Feet brown with a yellowish tinge; soles pure yellow.

Z. leucophrys is given by Dr. Kennerly as found on Bill Williams' River. It is well known that occasional specimens are taken in the range of habitat which belongs especially to *Gambeli*.

151. JUNCO HYEMALIS (L.) Sclater.

Rare and accidental. During the winter of 1864–65, I shot three typical examples of this species; in each instance in company with both the succeeding birds.

152. JUNCO OREGONUS (Towns.) Sclater.

Exceedingly abundant winter resident. Arrive at Fort Whipple about Oct. 10; soon become very numerous and continue so until the second week in April; stragglers seen till May * Keep quietly hidden in out of the way places till cold weather has fairly set in, when they become very familiar, and are to be seen everywhere.

Both sexes, and at all ages and seasons after the first autumnal moult, are *never* without the reddish along the sides of the body; and the head is never entirely concolor with back.

Perfectly adult males have the head, neck all around, and breast pure black, nearly as trenchantly defined against the reddish of the back as against the white of the belly. The sides are strongly tinged with pinkish rufous. The dull chestnut or reddish brown of the back extends on the scapulars and outer edges of the secondaries and greater coverts. This color merges insensibly into olive gray on the rump. The two outer tail feathers on each side are pure white; the third is white with an edging of dusky along its inner web to near the tip. The bill is flesh colored, or delicate pinkish white; its apex dusky. The tarsi are dusky flesh color, the feet more obscure.

The young female, early in winter, has the back more dully colored, while the rufous tinge invades the nape and to some extent the crown; and the edgings of the wings and coverts are very light, being gray rather than rufous. The black of the head and breast has a slaty tinge; and is sprinkled with light grayish or rufous, which interrupts the deeper color, though never to the extent of making the parts concolor with the back. The wash along the sides is fainter and duller. There is usually less white in the sides of the tail.

Between these two extremes is to be found every possible gradation. The great majority of all males have the continuity of the black on the nape interrupted by rufous tips to some of the feathers. A specimen (1138 of my collection, Dec. 12, 1864,) has a large abruptly defined pure white spot, of an irregular shape, on the chin. This is a curious example of partial albinism.

153. JUNCO CANICEPS (Woodh.) Baird.

Struthus caniceps, Woodhouse, Pr. A. N. S. Ph. vi. Dec. 1852. p. 202. Id. Sitgreave's Rep. Expl. Zuñi and Col. Rivers, 1853, p. 83, pl. iii.

Junco caniceps, Baird, B. N. A. 1858, p. 468.

Junco dorsalis, Henry, Proc. Acad. Philada.; Baird, B. N. A.

Numerous examples in my collection, agreeing with Woodhouse's types from the San Francisco Mountains. A not very abundant winter resident at Fort Whipple; times of arrival and departure, and general habits those of *oregonus*, with which it associates freely.

The red of the back is a subtriangular patch of a bright ferrugineous tint quite different from the chestnut of *oregonus;* its extent is smaller, and it is less distinctly defined against the gray both of the nape and rump; and does not at any age or season invade the wing coverts. The outer edges of the secondaries are grayish brown, even in full plumaged birds; but the wing coverts are purely cinereous gray like the rest of the body. The gray extends along the

* In this there is an absolute parallelism with *J. hyemalis*, as observed at Washington, D. C.

sides of the breast and belly; but it is much lighter in tint than on the upper parts; and has no very distinct line of demarcation with the white of the abdomen; which latter varies greatly in purity and extent. There is *never* any trace of reddish or pinkish on the sides; these parts being concolor with the throat and breast, as in *hyemalis*. The space between the eye and bill, and to a less extent the immediate circumocular feathers are blackish. The third lateral tail feather has a greater amount of dusky than of white. Females are like the males, except that the cinereous gray below is paler, the white abdominal region larger, and the union of these two colors more gradual.

I have thus gone somewhat into detail regarding the characters of *oregonus* and *canicepe*, because in my collection are several examples which I regard as most undoubtedly hybrids between the two. Their general aspect is that of *canicepe;* the head, neck and throat being slate gray, not black; the lores decidedly blackish, etc. There is a large dorsal area, colored as in *oregonus*, and, most marked feature of all, the sides are strongly tinged with pinkish fulvous, exactly as in *oregonus*, instead of being plain cinereous gray, concolor with the throat, as in *canicepe*. Other specimens preponderate still more towards *oregonus*, in having the head and neck rather slate black than slate gray.

The specimens are such palpable hybrids, that they need not in the least invalidate the specific distinctions between the two species. In the case of *Colaptes auratus* and *mexicanus*, it has been proven incontrovertibly that such a thing is entirely possible between closely allied though quite distinct species.

I have examined the type of Dr. Henry's *Junco dorsalis*, from Fort Thorn, now in the Philadelphia Academy; and I cannot discern wherein it differs from *canicepe* Woodh. This latter species however seems quite distinct from the Mexican *cinereus*, in the restriction of the chestnut to a well defined dorsal area, instead of its extending over most of the wing coverts and tertials; and in the wholly white outer tail feathers, whereas in *cinereus* a portion of their bases, especially on the inner web, are dusky. The range of habitat of the two species is also diverse.

154. Poospiza bilineata (Cass.) Sclater.

Rare at Whipple, where the nature of the locality is not suited to it. Very abundant in the southern and western portions of the Territory. Open plains, grassy or covered with sage brush.

In adult birds the black of the upper border of the superciliary streak extends across the forehead. Sometimes old birds have a decided ferrugineous tint in the gray of the upper parts; but are never streaked. The moult continues until October.

The young bird differs materially from the adult. There is no black about the head or throat, and the white streaks are nearly obsolete. The superciliary streak is short and indistinct; and is not bordered above by black. The lores are simply dusky and not pure black. The throat is pure white; and has a row of small spots on each side forming an imperfect maxillary streak, dividing the white of the throat from that of the side of the lower jaw. The upper parts are strongly tinged with dull ferrugineous; and are obsoletely streaked in the middle of the back with black. The wing coverts and tertials are strongly edged with ferrugineous. The breast is white streaked thickly with dusky. The tail is black as in the adult, and the outer feather is white on its external web; but the next three rectrices are not tipped with white. The lower mandible and the feet are dusky flesh color; instead of both being, as in the adult, bluish black.

155. Poospiza Belli (Cass.) Sclater.

Rather uncommon about Fort Whipple, for the same reason as mentioned under head of *P. bilineata*. Abundant in the sage brush of the Gila Valley. Keeps much on the ground, where its motions are very like those of a *Pipilo*.

(156.) SPIZELLA MONTICOLA (Gm.) Baird.
Rare and perhaps accidental. Colorado Chiquito River, *Kennerly*.

157. SPIZELLA SOCIALIS (Wils.) Bonap.
Very abundant summer resident. Arrives third week in March; remains until latter part of November; a few stragglers may possibly winter. For a month after its arrival it is in large flocks of fifty or more; and chiefly keeps on the ground in open places, like *Passerculus* or *Pooecetes*. In the fall, again, collects in large flocks, associating with *Chrysomitres* and *Pipilones*, and with *S. atrigularis*. Mates in latter part of April. Remains in moult through greater part of October.

Numerous specimens shot in the fall presented an aspect so different from the usual well-known immature style of *socialis*, that I received the impression of a distinct species. The color of the crown was more the light ferruginous of *monticola*, than deep chestnut, as in *socialis*. A large suite of adult spring birds I cannot distinguish satisfactorily from the common eastern bird.

158. SPIZELLA BREWERI Cassin.
Emberiza pallida of Audubon's works. Not of Swainson.
Spizella pallida of Kennerly's and Heermann's Reports, and of Coues, Ibis., April 1865, p. 164, from Arizona.
Spizella Breweri, Cassin, Pr. A. N. S. Ph. viii. 1856, p. 40. Baird, Birds N. A. 1858, p. 475.

Rare summer resident. A shy and retiring species, keeping mostly in thick brush near the ground.

This species constantly presents perfectly tangible differences from *pallida*, independent of the seasonal changes to which both are subject. In addition to the general paleness, or, so to speak, obsoleteness of all the markings of the body, the great differences in the colors and stripes of the head, as detailed by Cassin and Baird, readily separate them. *Breweri* has no ashy collar around the back and sides of the neck, and the breast; but the small streaks of the head and back are directly continuous. All the specimens before me measure rather more in length than those of *pallida*, due chiefly to a greater elongation of the tail. Other measurements do not exceed those of *pallida*.

Some July specimens, in moult, present a faded and dull gray appearance, with no signs of ochraceous on any part; and all the streaks are so narrow as to be merely faintly pencilled lines.

S. pallida is given by Dr. Kennerly from Bill Williams' River; and by Dr. Heermann from Tucson and Pima, in southern Arizona. These citations are doubtless to be referred to *Breweri*. *Pallida* is a species of the high central plains and the region of the Missouri. *Breweri* ranges through New Mexico, Arizona and California.

159. SPIZELLA ATRIGULARIS (Cab.) Baird.
Spinites atrigularis, Cabanis, Mus. Hein, 1851, p. 133.
Spizella atrigularis, Baird, B. N. A., 1858, p. 476.
Struthus atrimentalis, Couch, Pr. A. N. S. Ph. vii. 1854, p. 67.
Spizella evura, Coues, Newton's Ibis, January, 1865, p. 118. Ibid, April, 1865, p. 104. (A young bird, without black face and throat.)

Rare. Summer resident. Arrives early in April, and mates shortly afterwards; remains till middle of October. In small flocks or rather companies, in the fall associating with *Chrysomitris* and *Spizella*. In the spring has a sweet and melodious song, far surpassing in power and melody that of all other *Spizellæ*. Young birds want entirely the distinctive facial markings of the adults. Iris black. Bill dull red. Legs and feet brownish black. Length 6·00; extent 7·60; tail 3·10.

During my first autumn at Fort Whipple I shot numerous specimens of a *Spizella* generally resembling *S. atrigularis*, but wanting entirely the black face and chin. The interscapulars are of a quite different shade of chestnut. The

outer web of the external tail feather, and, to a less degree, the edge of the inner web of the same, are quite purely white. The bill is dusky brown above, dusky flesh color below, the feet black. The unusual length of the tail also attracted my attention.

A fully adult male, procured April 20, has the black face and chin exactly as in *atrigularis*. The interscapulars are of a brighter chestnut than in the fall bird. The slate gray of the head and breast is deeper and purer, and more markedly contrasted with the also purer white of the middle abdominal region.

An adult female in deep moult, procured July 21, has also no trace of black about the head.

Several specimens from Cape St. Lucas, in precisely the plumage of my autumnal Whipple examples, I find labelled by Baird with the MSS. name "*S. cana*, n. s."

It is just possible that large series may hereafter establish a species from Arizona and California distinct from the Mexican, both possessing the black on the face; but at present I cannot satisfactorily distinguish two species. Should they prove identical, they will afford an instance of a degree of seasonal variation quite unusual in the species composing the genus *Spizella*.

160. MELOSPIZA FALLAX Baird.

? *Fringilla melodia*, Wilson, Am. Orn. ii. 1810, 125, pl. xvi. f. 4.
Coues, Newton's Ibis, April, 1865, p. 165.
Zonotrichia fallax, Baird, Pr. A. N. S., 1854, 119.
Melospiza fallax, Baird, Birds N. A., 1858, p. 481.

Common; permanent resident. Habits, manners and voice precisely those of *melodia*.

The locality * whence were described the original specimens of "*Zonotrichia fallax*" is so near Fort Whipple that, for all practical purposes, it may be considered the same. Such differences as exist are detailed by Prof. Baird, ut suprà, with whose expressed opinion that the species is of doubtful validity I entirely coincide.

M. fallax occurs throughout New Mexico, Arizona, and part of Southern California, and is particularly abundant in the Valley of the Colorado. Westward of the Colorado Desert *M. Heermanni* chiefly replaces it. The latter species is very probably to be found at Fort Mojave.

(161.) MELOSPIZA LINCOLNII (Aud.) Baird.

This extensively distributed species, which occurs throughout the United States and Territories, and south into Central America, has been taken in the Territory by Dr. Kennerly. I have not myself met with it.

The following Finches most probably remain to be hereafter added to the list: *Peucæa Cassini* Baird, and *Embernagra rufivirgata* Lawrence, in the valley of the Gila and Southern Arizona generally; *Passerculus schistaceus* Baird, on the upper Colorado. (Specimens of the latter species are recorded from Fort Tejon, Cala.)

162. GUIRACA CŒRULEA (Linn.) Swains.

Generally distributed; nowhere very common. A single specimen taken near Fort Whipple, Aug. 10, 1865. "Arrives at Fort Mojave May 1st." (*Cooper.*)

163. GUIRACA MELANOCEPHALA Swains.

Abundant. Summer resident. Arrives May 1st; remains until latter part of September. Frequents the thick brush of ravines, etc., and the cottonwood and willow copses of the creek bottoms. Its ordinary note intimately

* "Pueblo Creek, New Mexico," is now known as "Walnut" Creek, Arizona, and is hardly a day's march from Fort Whipple, which lies but a short distance off the trail of Lieut. Whipple's party, in going from the San Francisco mountains to the Headwaters of Bill Williams' River.

resembles that of *Lophortyx Gambeli*. Its song is superb; a powerful but melodious succession of clear rich rolling notes, reminding one somewhat of the *Icterus baltimore*. "Not met with in the Colorado Valley." (*Cooper*).

164. CYANOSPIZA AMŒNA (Say,) Baird.

Summer resident; not abundant. More common somewhat further South.

PIPILO Vieillot.

The genus *Pipilo* of Vieillot, as now usually defined by ornithologists, seems to embrace species not strictly congeneric with its type, *P. erythrophthalmus*. The differences lie chiefly in the shape of the wings and tail, and in the relative proportions of these parts to each other, as well as in the pattern of coloration.

In the bird now generally known as *Pipilo chlorurus* these variations from the type are most marked. The long wings almost equal the tail, which latter is scarcely at all graduated. The elongated first primary gives a more pointed shape to the wing. The pattern of coloration is unusual and quite peculiar. The genus *Kieneria* was established by Bonaparte,* with the *Pyrgisoma Kieneri* as type; and under it this author ranges *rufipileus*, *fuscus*, *Abertii*, etc. But the *P. Kieneri* seems quite congeneric with the type of *Pyrgisoma;* in which event *Kieneria* becomes a synonym, untenable for this or any other group. "*Pipilo*" *chlorurus* being generically dissimilar from the type of *Embernagra* (*Saltator viridis* Vieillot,) to which genus it has been referred, very probably is wanting in a tenable generic application, unless the name *Chlorura* † fills this vacancy.

After thus eliminating *P. chlorurus*, there still remain, in North America, four species, *crissalis* ‡ Vigors, *mesoleucus* § Baird, *albigula* Baird, and *Abertii* Baird; which agree with each other in differing from the black, white, and chestnut group of which *P. erythrophthalmus* is the type, in the proportions of wings and tail, amount of graduation of the latter, and pattern of coloration. They should, I am of opinion, constitute a separate generic group, of which *P. Abertii* may be considered the type. I believe that this genus has yet to receive a distinctive name.

165. PIPILO MEGALONYX Baird.

Very abundant permanent resident. Rather more numerous in spring and fall than at other times. Shy and retiring, inhabiting the thickest brush. In in moult through part of July, whole of August, and half of September. Ordinary call-note almost exactly like that of *Mimus carolinensis;* the song a rather harsh and monotonous repetition of four or six syllables, something like that of *Euspiza americana*. Females found with mature eggs in oviducts as early as May 5th.

The female of this species is not brown, conspicuously different from the male, but only dull brownish black. I think this is the case also with the other western *Pipilos* with spotted scapulars; in which there is to be found no such sexual difference as is seen in *P. erythrophthalmus*.

In carefully examining a very large series of *Pipilo* from Arizona, as well as from other localities, I find it difficult to discern constant and tangible differences between *arcticus* and *megalonyx*. My specimens are all referrible to the latter species, or variety, if it be only one. I prefer now to leave the sub-

* Comptes Rendus. xl., Jan., 1855, p. 356.

† Used by Sclater, Cat. Amer. Bds., p. 117, as designating a subgeneric division.

‡ Vig. Zool. Voy. Beechey, v. p. 19, which equals *fuscus* of Cassin, Baird and other American writers, but not of Swainson.

§ Which probably is the true *fuscus* Swains. Syn. Mex. Bds. Phil. Mag. i. 1827, No. 46, and Two Cent., 1838, p. 347, No. 197. See Cabanis, Journ. f. Ornith., Nov., 1862, p. 474, for critique upon synonymy of *Pipilones*. But Cabanis' statement that *P. megalonyx* Baird is a synonym of *P. maculatus* Swainson will require confirmation.

ject as Prof. Baird has determined it; especially as in his forthcoming "Review" the matter will be re-examined.

(166.) "PIPILO" ABERTII Baird.

One of the most abundant and characteristic birds of the Valley of the Gila and Colorado. Ranges northward to within a few miles of Whipple, but is not found in the adjacent mountains. Common at Fort Mojave, and particularly so at Fort Yuma.

(167.) "PIPILO" MESOLEUCUS Baird.

Abundantly distributed throughout the warmer portions of New Mexico and Arizona, from the Valley of the Rio Grande to that of the Colorado. Not observed at Fort Whipple, though found breeding some twenty-five miles to the southward. Associates freely with the preceding, and inhabits the same regions; and the two have very similar habits.

This species is permanently and very distinct from *crissalis*, Vigors, of the California Coast, or from *albigula* of Cape St. Lucas; which species it replaces in the southern Rocky Mountain region.

168. "PIPILO" CHLORURA (Towns.)

Spring and autumn migrant; none breed or remain all winter. Passes rapidly by Fort Whipple; being found only during the latter part of April and beginning of May, and during the month of September. The most silent and retiring of the "Pipilos" being very difficult to observe or capture. "Winters sparingly at Fort Mojave," (*Cooper*).

The species varies a good deal in the color of the iris; e. g., No. 738, iris dark red; No. 739, iris olive brown; No. 740, iris reddish brown; all of which birds were shot at the same time.

(169.) PYRRHULOXIA SINUATA Bonap.

This Mexican species, introduced into the United States Fauna from the lower Rio Grande Valley, has been taken at Fort Yuma. It is now well known as a common bird of Cape St. Lucas.

The *Cardinalis igneus*, Baird, (Pr. A. N. S. Ph., Nov., 1859, p. 10,) very abundant at Cape St. Lucas, may also very probably be found in the southwestern portions of the Territory.

ICTERIDÆ.

170. MOLOTHRUS PECORIS (Gm.) Swains.

Very abundant summer resident; arrives middle of April and remains until October. Vast numbers seen at Fort Yuma in September. Winters abundantly in the Colorado Valley.

171. AGELÆUS PHŒNICEUS (Linn.) Vieill.

Common; resident. Most numerous in October and November. Associates constantly and intimately with the succeeding species.

A. gubernator is given by Dr. Kennerly from Pueblo Creek, Ariz. He very probably made an erroneous identification. It is doubtful if either *gubernator* or *tricolor*, so abundant in California, ever cross the desert to the Colorado Valley, except in isolated and accidental instances.

172. SCOLECOPHAGUS CYANOCEPHALUS (Wagl.) Cab.

Exceedingly abundant; permanent resident. The typical Blackbird of Fort Whipple. Comparatively few breed in the immediate vicinity. Towards the end of September they become very numerous, and continue so until May, when few are to be observed until the following fall. Congregate in immense flocks about the clearings, stock corrals, etc., and are tame and familiar. By no means a marsh species, but rather a pinicoline one. Their note is a harsh rasping or grating squeak, varied at intervals by a rather melodious ringing whistle.

Male; average 10·00×16·50: iris light creamy yellow. Female; average 9·00×15·25; iris brown. Autumnal males are frequently seen in nearly complete plumage.

173. XANTHOCEPHALUS ICTEROCEPHALUS (Bon.) Baird.

Rather uncommon, being less numerous than at most other localities where found at all. Chiefly a summer resident. Rather a marsh and prairie species, than a bird of mountainous regions.

The variations in the tint, and in the extent or restriction of the yellow, dependent upon age, sex or season, as well as purely accidental, are very great, and almost interminable. Some immature males have the head saffron or ochraceous, the nape clouded with black, and a distinct median longitudinal black stripe along the crown. Sometimes very young males show no yellow whatever. The size is also liable to great variation; a female before me being hardly half the size of an adult male. (Wing 4·25 instead of 5·50; tail 3·25 instead of 4·10, etc.)

174. STURNELLA NEGLECTA Audubon.

Rare; resident. The nature of most of the vicinity of Fort Whipple is not well adapted to the habits of this species. I never saw a half dozen individuals during my whole stay.

175. ICTERUS BULLOCKII (Sw.) Bon.

Common summer resident. Almost exclusively frequents the willows and cottonwoods of the creek bottoms, to the small twigs of which its pensile nest is attached. Arrives late in April, and remains through greater part of September.

The female is plain grayish olive (pure gray on the rump,) brightening into olive yellow on the nape, upper tail coverts and tail. Forehead, superciliary streak, sides of head and neck, and a large space on the breast bright yellow. Space between eye and bill and the whole chin pure white. Rest of under parts grayish white, tinged with yellow on the under tail coverts. Median wing coverts broadly edged and tipped with white. Bill and feet similarly colored with those of the male.

CORVIDÆ.

176. CORVUS CARNIVORUS Bartram.

Corvus cacalotl, Wagler. Isis. 1831, 527. (Mexico.) Baird, B. N. A. 1858, p. 563. (Colorado Valley.)

Corvus carnivorus, Bartram; Baird. B. N. A. 1858, p. 560.

Resident. Very abundant, especially about the clearings, cattle enclosures, etc., where it congregates in immense numbers in the autumn and winter. During the severe winter of 1864–5 great numbers perished at Fort Whipple by cold and hunger.

I cannot distinguish the Colorado Raven even as a well-marked variety of *carnivorus*. Specimens from all points between the Arkansaw river and the Colorado desert seem to me quite identical.

177. PICICORVUS COLUMBIANUS (Wils.) Bon.

Abundant at irregular intervals during the winter months; from the middle of October till March. High open forests. Restless, shy and noisy.

Iris brown; bill and feet black; hard parts of mouth livid, fauces pinkish. Specimens in moult have the plumbeous intercalated with a hoary, almost ochraceous whitish, produced by the fading of the original colors. Individuals vary much in size.

178. GYMNOKITTA CYANOCEPHALA Maxim.

This singular and interesting species has the form of a crow; but its colors and its habits are most decidedly garruline. It is a very abundant and characteristic bird at Fort Whipple, remaining all the year. It breeds in the

retired portions of the neighboring mountains, the young leaving the nest early in July. During the winter months they collect in immense flocks; sometimes, as I witnessed in at least one instance, to the extent of a thousand or more. These large companies scour the country about, flying restlessly and noisily from place to place, and generally scattering over a considerable area. They are shy and wary, so that, notwithstanding their numbers, they are difficult to shoot. Their food is chiefly seeds, berries and nuts, especially the nuts of the *Pinus edulis*, and the berries of *Juniperus pachyderma*. They alight much on the ground, where their gait is firm, erect and easy. Their flesh is quite palatable.

Iris brown. Bill and feet black; soft parts of mouth rose red; corneous parts black. Males range from 11·50 to 12.00 in length, by from 16·50 to 19·00 in extent; the females from 11·00 to 11·50 in length, by 16·25 to 18·00 in extent. Differences in length are by no means always accompanied by corresponding discrepancies in extent of wings. The intensity of the blue is liable to great variation, as is also the distinctness of the white gular streaks. The blue of the head usually merges quite insensibly into the grayish blue of the back; but there is often quite a distinct line of demarcation. Specimens in poor plumage have frequently light gray primaries.

179. CYANOCITTA WOODHOUSEI (Baird.)

Cyanocorax californica, Woodhouse, in Sitgreave's Rep. Expl. Col. and Zuñi R. 1853, p. 77. (San Francisco Mts.)

Cyanocitta Woodhousei, Baird. B. N. A., 1858, p. 585.

Resident, and exceedingly abundant, being the most characteristic species. Found in all situations; but rather shuns dense pine woods and keeps on the open hill-sides, among the scrub oaks, etc. In winter collects in rather large flocks, sometimes as many as fifty; usually, however, seen in little companies of half a dozen individuals. A restless, vigilant, shy, and noisy species.

Males average 12·00×16·50; females about 11·25×15·50. In moult, examples are often seen with gray like that of the dorsal patch intercalated with the blue of the head. Iris brown; bill and feet black. Mouth dull bluish white.

I think there is no doubt of the propriety of separating the southern Rocky Mountain *Cyanocitta* from the true *californica* of the Pacific coast. The characters as detailed by Baird, ut suprâ, are very constant and quite appreciable.

It is very probable that *C. californica* and *C. Woodhousei* will be found associated at certain portions of the Colorado desert, as for example along the Mojave river.

(180.) CYANOCITTA SORDIDA (Sw.) Baird.

Chiefly a Mexican species, but extending northward to the Gila Valley. Fort Buchanan, *Dr. B. J. D. Irwin, U. S. A.* Copper mines, *J. H. Clark.*

181. CYANURA MACROLOPHA Baird.

Common; resident. Almost exclusively pinicoline. Generally found in small companies: never congregating to the extent even which *C. Woodhousei* does. Very shy, vigilant, noisy and tyrannical.

A very young bird taken July 22, on the San Francisco mountains, besides being smaller, and having a weaker bill and feet, differs considerably from the adult in colors. The upper parts are rather smoky brown than blue; and this color also invades the rump. Below the colors are also fuliginous; only a slight leaden or grayish cast indicating the future bright blue. At the same time the wings and tail are nearly as bright blue as in the adult; but the black bars upon them are very obsolete, or wanting altogether. There is considerable of a crest, but its color is fuliginous black instead of deep glossy black; and there are no traces of the white front and white about the eyes. The crest is about as long as that of an adult *Stelleri*.

The differences between this species and *Stelleri* of the Pacific coast, as detailed by Prof. Baird, seem to me quite sufficient to separate them. I may add, that in *macrolopha* the bluish white wash on the front occupies, when the feathers are undistorted, two straight lines, ascending perpendicularly from each nostril, and quite distinct from each other; while in *Stelleri* the tendency is for the whole front to be indiscriminately washed with bluish. In both species, the colored tips of the frontal feathers have a somewhat different texture and consistence from their dark basal portions.

A large series of specimens, chiefly from the head waters of the Columbia* have the front washed with dull blue just as in *Stelleri;* and have also the white supra-ocular spot of *macrolopha*. It is quite possible that hybrids of the two species may occur; but I am not prepared to say positively that such is the case in the present instance. Both species are found in the regions above referred to.

(182.) PICA HUDSONICA (Forst.) Bon.

Sparingly distributed throughout the Territory. Not personally met with at Whipple.

Young birds shot in June in the Raton Mountains near Taos, N. M., have the bill tipped with yellowish. The tail is only about three inches long. But there is a most remarkable similarity in color to the adults; almost the only perceptible differences being a restriction of the white on the primaries, and rather dull greenish black instead of violet black wings and tail.

The yellow billed *P. Nuttallii*, so abundant in Southern California, does not appear to cross the Colorado desert to the river.

COLUMBIDÆ.

183. COLUMBA FASCIATA Say.

Summer resident; very rare; observed only on two occasions.

184. MELOPELEIA LEUCOPTERA (Linn.) Bonap.

Rare; summer resident. Young birds, half fledged, taken Aug. 15, 1864.

185. ZENAIDURA CAROLINENSIS, (Linn.) Bonap.

Abundant summer resident. Arrives last week in April, remains until middle of October. "Winters at Fort Mojave, and on the Pacific coast as high as San Francisco." (*Cooper.*)

To the traveller on the dry sandy wastes of Arizona this bird is always a welcome sight, indicating with certainty the presence of water in the vicinity. I have never known the sign to fail in my own limited experience. The nature of the food ordinarily taken necessitates an abundant supply of water. This was satisfactorily demonstrated to me on one occasion, when the crops of several, shot just as they were coming to drink, were filled with small seeds, as dry and hard as when first ingested, and totally unassimilable until macerated with water.

186. CHAMÆPELEIA PASSERINA (Linn.) Swains.

A rare and probably accidental visitor to the Valley of the Colorado. (Fort Yuma, *Ives*, La Paz, *Hutton.*) Probably goes at least as high as Fort Mojave. Perhaps variety *pallescens* Baird, from Cape St. Lucas.

PHASIANIDÆ.

187. MELEAGRIS MEXICANA Gould.

There can be no doubt of the propriety of separating the Western Turkey from the common species of the Eastern United States. The differences are very decided, and of such a character as to have an important bearing upon the question of the origin of the domesticated bird. The latter, as is well known, usually approaches *mexicana* rather than *gallipavo*, in its colors.

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*The locality whence came the *Garrulus Stelleri* of Swainson (F. B. A. 1831, ii. p. 294, pl. liv.) which is probably rather referrible to *macrolopha* than to the true *Stelleri*.

The wild Turkey is a permanent resident of the mountains of the immediate vicinity of Whipple, but quite rare, so much so that I procured no specimens. In some portions of the Southern Rocky Mountain region it is exceedingly numerous.

I have never detected any of the *Tetraonidæ* in Arizona, though very probably the *Centrocercus urophasianus* may be hereafter found towards the Utah border. Dr. Cooper has seen it on the Mojave River, about the southernmost point it has yet been observed.

Among the *Lagopidæ*, the *Lagopus leucurus* has been detected as far south as Cantonment Burgwyn, in New Mexico, (lat. 37°,) and most probably will be found in the mountains near the northern border of the Territory.

PERDICIDÆ.

188. LOPHORTYX GAMBELII Nuttall.

L. Gambelii, "Nuttall." Gambel, Pr. A. N. S. Ph. 1843, p. 260. Baird, B. N. A. 1858, p. 645. Coues, Newton's Ibis. Jan., 1866, p. 46. (Biographical.)

"*Lophortyx californicus*," Coues, Newton's Ibis, 1865, p. 165. (Erroneous identification.)

The common and characteristic Quail of the Southern Rocky Mountain region from the Rio Grande to the Colorado, and south into Mexico. Replaces the *L. californica*. The two species have been found associated at Soda Lake, the sink of the Mojave River.

In my paper, as above, will be found some account of the habits of this Quail, which I had previously, in the same Journal, (Ibis, 1865, p. 165,) incidentally mentioned erroneously as *L.* "*californicus*." From a large suite of specimens, I can describe the following stages from the callow state to the fully adult condition.

Downy state, a few days old.—Bill bright reddish above, nearly white beneath; feet dull flesh color. Head yellowish white tinged with grayish brown; the occiput with a broad spot of pure brown; on the centre of the crown (whence the plume will spring) a few black feathers, each longitudinally streaked with white. Entire upper parts brownish gray, (color of the lighter parts of the back of a *Sturnella*,) mottled with spots of black, and very conspicuously streaked with long, sharply pencilled lines of white. Primaries dusky, their outer vanes marbled with brownish black and grayish white. Whole under parts from the white jugulum narrowly and semiconfluently barred with black and ochraceous white, and longitudinally streaked with short but distinct lines of pure white. This coloration is most marked and definite on the breast; on the flanks and under tail coverts the markings are duller and more blended. The newly sprouted tail feathers are colored like the primaries. Length about 3½; wing 1¾; tail ½. This stage may be seen up to the last of August.

Quarter grown. (Aug., Sep.; length 6 or 7 inches.) The general hue is dull leaden gray, becoming ochraceous on the scapulars and wing coverts, which are still a little mottled, as described above. Below the gray is very light indeed, almost whitish, especially on the chin and middle of the belly. Breast obsoletely waved with light and dark shades of gray, with still some slight traces of the white longitudinal lines; the crissal and anal regions the same, but somewhat tinged with brown. On the sides under the wings there is a slight fulvous or ferrugineous tinge, but nothing like definite strips. Primaries plain dusky; tail more plumbeous; very finely marbled with blackish and whitish. There is a broad superciliary white stripe extending to the extreme occiput.

During first autumnal moult. (Sep., Oct., Nov.) The preceding two plumages are those of chicks, with few true feathers. When the autumnal moult has made some little progress, the features of the adults begin to appear, mixed in a varying degree with the preceding downy colors. Some of the

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wing coverts and secondaries are still mottled, and the tail is a littled marbled, but most of the feathers are clear plumbeous. On the breast, feathers of this latter color are interspersed with the wavy gray ones. While the faint ferruginous flush of the sides is retained, there are apparent the definite stripes of the adult. The crest is now an inch long, but still straight, not recurved, and rather brown than black. The bill is quite black, and the feet dark colored. At this season the peculiar head markings begin to appear, so that the sexual features are quite apparent.

The early age at which the crest begins to be apparent is surprising. Two or three feathers longer than the rest very plainly indicate it in chicks only a week or two old. But it does not become black and expanded and recurved at the tip, till the bird is full grown and has completed the moult.

Adult. Iris clear brown. Bill black. Legs and feet brown, sometimes with a livid bluish tinge.

(189.) CALLIPEPLA SQUAMATA (Vig.) Gray.

From the Valley of the Gila and Lower Colorado, as well as that of the Rio Grande. Not detected as far north as Whipple.

190. CYRTONYX MASSENA (Less.) Gould.

I had frequently been informed of the occurrence of this species at Fort Whipple, but I never met with it on but two occasions, when an adult male and female were procured. It is doubtless a resident, though rare species.

No. 1586. ♀. Oct. 11, 1865. Length 9·00; extent 17·00; wing 4·80; tail 2·00; bill ·60; tarsus 1·20. Upper mandible dull reddish horn; lower bluish white. Mouth whitish flesh color. Legs, feet and claws livid white, with a somewhat yellowish tinge posteriorly. Iris brownish olive. The cutedges of the lower mandible are doubly dentated near their end.

[Note. Many of the following Water Birds are really identified with the Whipple series, but only those actually seen by me in that locality are given with uninclosed number.]

GRUIDÆ.

(191.) GRUS CANADENSIS (L.) Temm.

Abundant on the Colorado and Gila Rivers.

ARDEIDÆ.

(192.) GARZETTA CANDIDISSIMA (Gm.) Bon.

Very abundant throughout the Valley of the Colorado.

(193.) HERODIAS EGRETTA (Gm.) Gray.

Abundant along the Colorado. Very probably the large variety *californica* (Baird B. N. A. p. 667,) may also be found within the limits of the Territory.

(194.) ARDEA HERODIAS Linn.

Exceedingly abundant along the Colorado River. The nests of this species are often seen on some ledge of rock projecting from the precipitous cliffs which are covered with innumerable nests of *Petrochelidon lunifrons.*

(195.) ARDETTA EXILIS (Gm.) Gray.

Generally distributed on the streams and cienegas of the Territory. Common on the Colorado.

(196.) BOTAURUS LENTIGINOSUS (Mont.) Steph.

Throughout the Territory. Common.

(197.) BUTORIDES VIRESCENS (L.) Steph.

Very numerous along the Colorado and other streams of the Territory.

(198.) NYCTIARDEA GARDENI (Gm.) Baird.

Generally distributed; nowhere very numerous.

TANTALIDÆ.

(199.) TANTALUS LOCULATOR Linn.

Very common on the Colorado, at least as high as Fort Mojave, but especially abundant on the lower portions of this river and of the Gila. Great numbers seen at Fort Yuma.

200. FALCINELLUS ORDII Bonap.

Sparsely distributed throughout New Mexico and Arizona. I have seen it at intervals from the Rio Grande to the Colorado. Fort Whipple, Oct. 18, 1864, and at other times during the autumn.

CHARADRIIDÆ.

201. ÆGIALITIS VOCIFERUS (L.) Cass.

The only small wader found in any considerable numbers about Fort Whipple. Summer resident, arriving early in April and remaining until November.

(202.) ÆGIALITIS SEMIPALMATUS, (Bp.) Cab.

Colorado River, September and October, 1865.

The *Charadrius virginicus*, and the *Squatarola helvetica* are both doubtless to be found in the Territory, though I have never seen specimens from within its limits.

PODASOCYS* Coues, nov. gen.

Ch. Gen. Bill two thirds as long as the skull; equal to the middle toe and claw; but little more than half the tarsus. Wing of moderate length, reaching when folded beyond the tail; second primary nearly as long as the first. Tail exceedingly short, contained twice in the length of the wing from the carpus; square; the rectrices broad to their obtusely rounded tips. Legs stout and very long; denuded portion of tibia two-thirds as long as the tarsus, the latter nearly twice as long as the middle toe and claw; tibia and tarsus entirely covered with small, polygonal, reticulated plates, largest on the anterior face of the tarsus. Toes very short and stout; lateral ones unequal in length; tip of inner claw nearly reaching base of outer lateral one; tip of the latter falling short of the base of the middle one. Claws short, obtuse and little curved. Of moderate size, compact form and dull colors.

Type. *Charadrius montanus* Towns.

In general form this genus approaches somewhat *Ægialitis*, especially that section of which *melodus* is typical (*Ægialeus*). But it differs widely in the very short square tail, long denuded tibiæ, very long tarsi, much abbreviated toes, etc. It is possible that some genus already founded upon an exotic type may include *montanus*, but knowing of none such, I have no other alternative than to institute a new name, in separating a heterogeneous element from the genus with which it is usually associated.

203. PODASOCYS MONTANUS (Towns.)

This species has an extensive range quite from the northern boundary of the United States to the Mexican border, and perhaps much farther each way; though at the same time it is strictly confined to the western portions of the continent. It is sparingly distributed throughout Arizona. I have constantly met with it from the Rio Grande to the Pacific, in all the regions suitable to its peculiar habits. I believe it is quite confined to dry plains either entirely bare or covered with straggly brush. In its habits it differs as much from most other *Charadriinæ* as does its form; calling irresistibly to mind the *Eremophila cornuta*. The stomachs of the specimens examined contained orthopterous and coleopterous insects.

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* From the Homeric epithet ποδας ωκυς—"swift-footed."

RECURVIROSTRIDÆ.

(204.) RECURVIROSTRA AMERICANA Gmelin.
Recurvirostra occidentalis Vigors. Young.
Seen in large flocks on the sand-bars of the Colorado.

(205.) HIMANTOPUS NIGRICOLLIS Vieill.
Common on the Colorado, in flocks, with the preceding.

PHALAROPODIDÆ.

(206.) STEGANOPUS* WILSONII (Sab.)
A single specimen seen on the Colorado, Sept., 1865. The species is very generally distributed throughout the interior of North America.

SCOLOPACIDÆ.

(207.) GALLINAGO WILSONI, (Temm.) Bon.
Sparingly distributed throughout the Territory.

(208.) MACRORAMPHUS GRISEUS (Gm.) Leach.
Sparingly distributed throughout the Territory. Perhaps *M. scolopaceus* may also be found.

(209.) ACTODROMAS BAIRDII Coues.
Tringa "Schinzii," Woodhouse, Sitgreave's Expl. Zuñi and Col. River, 1853, p. 100. Not of Brehm, nor of authors generally.
Tringa Bonapartei, "Schlegel," Cassin, in Baird's B. N. A., 1858, p. 923. In part. Of the specimens there enumerated Nos. 4869, 5442, 8800 are of this species; No. 3451 is the true *Bonapartei*.
Actodromas Bairdii, Coues, Pr. A. N. S. Ph. 1861, p. 194.

Very generally distributed throughout the whole interior of North America. No instances of its occurrence on either the Atlantic or Pacific coasts have come to my knowledge. Examination of several specimens taken near the Pueblo of Zuñi, in New Mexico, by Dr. S. W. Woodhouse, which were not accessible at the time of the preparation of my monograph, as above, shows them to belong to this species, and not to the *A. Bonapartei*, with which Dr. Woodhouse had identified them under the erroneous name of *Tringa Schinzii*. These specimens are interesting, as extending the range of the species west of the Rocky Mountains, and causing it to be included in the Whipple avifauna.

This species has been recently referred to *A. maculata*, and considered as founded upon a smaller race or upon immature specimens of the latter species, by Dr. H. Schlegel;† certainly an unfortunate error, and one well illustrating how unsafe it is to pass judgment upon a species with which we are autopically unacquainted. If there be any specimens in the Museum of the Pays-Bas referrible to *maculata* in any of its variations of size or colors, they are by no means examples of the species I have named *Bairdii*.

(210.) ACTODROMAS MINUTILLA (Vieill.) Coues.
Seen in flocks on Little and Great Colorado Rivers, from July to October.

(211.) EREUNETES PUSILLUS (Linn.) Cass.
Common on the Colorado. It is quite possible that Mr. Lawrence's new *E. occidentalis* may also be found on the streams of the Territory.

212. SYMPHEMIA SEMIPALMATA (Gm.) Hartl.
Sparsely distributed throughout the Territory. Individuals seen Oct. 18th, 1864, in a marsh near Whipple.

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* The three North American species of Phalaropes are so dissimilar in form as to amply indicate as many generic types: *Steganopus* Vieill. (*Wilsonii*); *Lobipes* Cuv (*hyperboreus*); and *Phalaropus* Briss. (*fulicarius.*)
† Article *Tringæ* in Cat. Mus. d'Hist. Pays-Bas.

(213.) GAMBETTA MELANOLEUCA (Gm.) Bon.
Abundant on the Colorado.

214. RHYACOPHILUS SOLITARIUS (Wils.) Bon.
A single specimen taken at Fort Whipple, August, 1864; at a small pool in high thick pine woods.

(215.) TRINGOIDES MACULARIUS (L.) Gray.
Very numerous along the Colorado.

216. NUMENIUS LONGIROSTRIS Wilson.
A single specimen, taken in August, 1864, at Fort Whipple.

Other limicoline Grallæ to be found, probably, are *Tryngites rufescens* and *Limosa fedoa*.

RALLIDÆ.

(217.) RALLUS VIRGINIANUS L.
This species has been detected in the Territory.

(218.) PORZANA CAROLINA (Linn.)
Colorado River, *A. Schott.* I think it probable that one or two other Rails are to be added to the avifauna of the Territory.

(219.) FULICA AMERICANA, Gm.
Abundant along the Colorado.

ANATIDÆ.

(220.) CYGNUS AMERICANUS Sharpless.
Colorado River. Fort Mojave, *Cooper*.

221. ANSER HYPERBOREUS Pall.
Common on the Colorado. Specimen taken near Fort Whipple, Oct. 17, 1864.

(222.) ANSER GAMBELI, Hartl.
Anser frontalis, Baird, B. N. A. 1858, p. 762. Young. (Fort Thorn, N. M.)
Colorado River. Abundant.
I am informed by Prof. Baird that he is now satisfied that his *A. frontalis* is only an immature stage of plumage of *A. Gambeli*. An analogous plumage is known as one of the conditions of the European *Anser albifrons*.

(223.) BERNICLA CANADENSIS (L.) Boie.
Colorado River.

(224.) BERNICLA HUTCHINSII (Rich.) Bon.
One of the most abundant geese of the Colorado Valley. *B. nigricans* seems to be exclusively a maritime species.

225. DENDROCYGNA FULVA (Gm.) Burm.
A pair, taken in November, about twenty miles from Fort Whipple. This is the only instance in which the species has come under my observation from Arizona. *Dendrocygna autumnalis* will also doubtless be found in the Territory.

226. ANAS BOSCHAS L.

227. DAFILA ACUTA (Linn.) Jenyns.

228. NETTION CAROLINENSIS (Gm.) Baird.
These three species are abundant on all the waters of the Territory.

229. QUERQUEDULA CYANOPTERA, (Vieill.) Cass.
Numbers of this Teal were observed in October on the head of the San Francisco River, near Whipple. At the same season during the following year I saw them in numbers on the Colorado River.

The three following *Anatinæ* are also found on the Colorado River:

(230.) MARECA AMERICANA (Gm.) Steph.

(231.) SPATULA CLYPEATA (L.) Boie.

(232.) CHAULELASMUS STREPERUS (L.) Gray.

(233.) BUCEPHALA ALBEOLA (L.) Baird.

This is the only one of the *Fuligulinæ* which, so far as I am aware, has been actually brought from Arizona; though undoubtedly species of *Fulix* and *Aythya* are found within its limits.

The same remarks apply to several species of *Merginæ*; especially to *Mergus serrator*, and *Lophodytes cucullatus*.

LARIDÆ.

(234.) LARUS DELAWARENSIS Ord.

This species I saw on the Colorado in the autumn of 1865. It is very probable also that the *L. californicus* may be detected in the same region. Mr. Xantus has sent it from Fort Tejon, California.

(235.) CHROICOCEPHALUS ATRICILLA (L.) Lawr.

Colorado River, particularly its lower portions. A specimen taken over a hundred miles from any body of water, near the eastern border of the Territory.

(236.) CHROICOCEPHALUS PHILADELPHIA (Ord.) Lawr.

Very abundant on the Colorado. I am under the impression that I also saw *Ch. Franklinii* about twenty miles from the river near Fort Mojave. The Colorado Valley is quite within its known range of migration.

237. STERNA FORSTERI (Nuttall) Lawrence.*

S. hirundo, Sw. et Rich. F. B. A. 1831, ii. 412. (Nec. Linn.)

S. Forsteri, Nuttall, Man. Orn. 1834, ii. p. 274. (In foot-note under *S. hirundo*; name proposed in event of "*hirundo* Sw. Rich." proving distinct. No full description.)

Lawrence, Ornithological Notes, in Ann. Lyc. Nat. Hist. of New York, 1852, page 3. Lawrence, B N. A. 1858, p. 862. (Definite characterization of species, and full description.) Coues, Rev. Terns N. A.. Pr. A. N. S. Ph. 1862, p. 544. (Gives the different ages and stages of plumage, and comparisons with *hirundo* and *macrura*.)

S. Havelli, Audubon, Orn. Biog., v. 1839, p. 122, and his other works. Lawrence, Birds N. A., 1858, p. 861. Coues, Rev. Terns N. A., Pr. A. N. S. Ph. 1862, p. 543. (Considers it as adult winter plumage of *Forsteri*.)

This species occurs on the Colorado, as indeed on most other of the large rivers of the interior.

(238.) HYDROCHELIDON FISSIPES (Linn.) Gray.

Sterna fissipes, Linn., S. N., 12th ed., 1776, p. 228.

Hydrochelidon fissipes, Gray, Genera, iii. 1849, p. 660. Coues, Pr. A. N. S. Ph., Dec., 1862, p. 554.

Sterna nigra, Brisson, Boie, and other authors, but not of Linnæus, which is *leucoptera* auct.

Sterna plumbea, Wilson; *Hydrochelidon plumbea*, Lawrence, and other American writers. (American bird identical with European.)

Has been taken on the Colorado. "Mojave River," *Cooper*.

* To Mr. G. N. Lawrence of New York is entirely due the credit of first bringing this species prominently into notice, so long ago as the year 1852, and of carefully distinguishing it from *hirundo*. Nuttall's original notice is so brief and unsatisfactory, that it should hardly be accepted as the first characterization of the species; which ought in all propriety to bear Mr. Lawrence's rather than Mr. Nuttall's name. For further elucidation of this Tern, see my Rev. Terns N. A., ut supra.

I have seen *Sterna antillarum* mihi ex Lesson, (*frenata* Gamb. *argentea* Nutt. nec Maxim. *minuta* Wils. nec L.) from the coast of California, and have little doubt that it is found on the Colorado River as well.

PELECANIDÆ.

(239.) PELECANUS ERYTHRORHYNCHUS Gm.
Abundant on the Gila and Colorado Rivers.
It is a question with me whether this species should retain the name above given by Gmelin; to the exclusion of the very pertinent "*trachyrhynchus*" Lath. The bill is not red at all, but yellow; and it is the *P. fuscus* whose bill really is red. The name thus conveys such an erroneous impression, as should justify its rejection.
The *P. fuscus* is essentially a maritime bird, and if found upon the Colorado at all, is probably only a straggler.

PHALACROCORACIDÆ.

(240.) GRACULUS DILOPHUS (Sw.) Gray.
Gulf of California and lower Colorado, *Cooper*.

COLYMBIDÆ.

(241.) COLYMBUS TORQUATUS Brünn.
Winter resident on the Colorado river. Common.

(242.) COLYMBUS PACIFICUS Lawr.
C. pacificus, Lawrence, Birds N. A. 1858, p. 889. Coues, Syn. *Colymbidæ* N. A. in Pr. A. N. S. Ph. 1861, p. 228. Coues, Newton's Ibis, 1866.
Much material additional to that possessed by Mr. Lawrence in 1858, or by myself in 1861, tends to confirm the validity of this species, first described from young specimens. I have since then seen large suites of adult birds, chiefly from the interior of Arctic America, and am quite confident that my remarks (l. c.) upon its relations to *C. arcticus* are pertinent. See also my notes in Newton's Ibis, as above cited.

PODICIPIDÆ.

(243.) PODICEPS (DYTES) CORNUTUS Lath.
Colorado River.

(244.) PODICEPS (PROCTOPUS) CALIFORNICUS (Heerm.) Coues.
Podiceps californicus, Heermann, Pr. A. N. S. Ph. 1854, p. 179. Young bird. Lawrence, B. N. A., 1858, p. 896. Young.
Podiceps (*Proctopus*) *californicus*, Coues, Syn. *Podicipidæ*, in Pr. A. N. S. Ph. 1862, p. 231. (Considers it as =*P. auritus ex Americâ.*)
Ponds near Fort Mojave, Colorado River, *Cooper*.
The original *P. californicus*, as characterized by Dr. Heermann, is based upon an immature bird, and its relationships to *P. auritus* by no means indicated. It was shown in the Proceedings of the Philadelphia Academy for 1862 that the bird is neither more or less than the young of the American *auritus*; full plumaged specimens of which I easily distinguished from the European *auritus*. The name *californicus* I adopted as obviating the necessity of a new one, although Dr. Heermann's diagnosis gives none of the special points which separate the bird from *auritus*; but shall claim the species for my own, from the very different interpretation of it which I have elucidated.

(245.) PODILYMBUS PODICEPS (L.) Lawrence.
Colorado River. Abundant.

April 3d.

MR. CASSIN, Vice-President, in the Chair.

Twenty members present.

The following was offered for publication: Observations on Chætetes, etc." By C. Rominger, M. D.

April 10th.

MR. VAUX, Vice President, in the Chair.

Twenty-nine members present.

A letter was read from Dr. G. Lincecum, of Texas, containing a history of the "small black erratic ant," as follows:

The small black, crooked running ant, socommon in everybody's yard, and on almost every growing twig in spring time and summer, is called, in my catalogue of ant species, the erratic, or crazy ant. He is No. 5 in my notes on the various types of ants. In this species, the formic acid odor is very strong when the ant is crushed. He is quick in his movements, does not make paths, but travels in scattered files, in the same direction, sometimes several hundred yards; moves quickly on a general course, running very crooked the whole route, giving his path a broad range, travelling two or three times the distance to his place of destination. All along the range of their path, at unequal distances, are depots or station-houses, at which they often call as they pass along, giving the whole affair quite a business aspect. Or it may be that what I have denominated depots or station-houses, will turn out, on a more careful investigation, to be a line of regularly constituted and well organized confederate cities, among which there is carried on a rapid and extensive commerce. At any rate, there can be no doubt of the fact that they are engaged in an extensive and well-established, reciprocal intercourse throughout the entire line of their cities. Cripple one of them on the route of his travel, and you produce the wildest excitement, and the invalid will be visited and examined by perhaps 500 of the travelling throng in the course of two or three minutes. If the case is a curable one they work with him until he is on foot again, when he moves onward with the crowd as before. If he dies, they remove him from the range of the great thoroughfare, and business rolls on again.

They sometimes wage war with the red-headed tree-ant, (he is the No. 4 of my catalogue, and may be fully described in some future article), and the conflict is generally quite disastrous. Notwithstanding the fact that they are always able to bring to the field more than ten times the number of their red-headed foe, they often meet with defeat.

I was spectator to a battle, or rather a field fight, between these two species of ant, that continued four or five hours. Small parties were engaged in the deathly conflict at sunrise, when I first observed them. They were fighting in the wagon road, and their numbers were rapidly increasing. At the time I was called to breakfast, they were in considerable force on both sides, and when I returned I found both armies greatly augmented. Reinforcements were constantly arriving, and the battle was raging over an area of eight to ten feet in diameter. The discipline and modes of battle of the two species are entirely different. The method of attack, by the little black ant, is aimed altogether at the feet and legs of the foe; and as they greatly outnumber the red heads, by engaging them two or three to one, they succeed in maiming and rendering large numbers of them unfit for service. The red heads seem

to aim only at decapitation, and this they accomplish with dexterity and surprising facility. Reinforcements were momentarily arriving to both armies. Thousands were already engaged, and the bloody strife was raging over the entire area of the battle-field.

Being controlled only by two forces,—desperation and death—the scene was terrific beyond my powers of description. In all directions, everywhere, were seen the dire effects of relentless war. The battle-field was already thickly strewn with the dead and dying, over whom, in regardless tramp, swept the furious antagonism. Here indeed was, for once, at least, full manifestations of the unmistakable, genuine "tug of war." Violently struggling and gnashing their jaws; clinging together and wallowing on the ground, in companies, in squads and single combat, the direful contest fiercely raged. Dispatches had been sent off by the black ants for their entire reserve to be forwarded immediately, and they were pouring out by the million from the gates of their great city,—distant about 60 feet,—and hurrying toward the battle-field. They were evidently making a forced march, and their numbers were so great, that by the time they had progressed 20 to 30 feet, their line of march suggested the idea of a broad black ribband trailing on the ground, and there seemed to be no end to them, for they were still flowing out from the city in countless thousands.

At this crisis their army on the battle-field gave way and was routed, and in a general panic commenced a retreat. Soon, in their disorderly flight, they met their reinforcements and communicating to the front ranks their total and disastrous discomfiture, the panic became universal, and reinforcements and all fled precipitately into the city. In five minutes there were no black ants to be seen above ground. The news of the great battle and its disastrous results seemed to have been spread around to those even who had not been engaged in the battle, but who were busied in their daily avocations. At all events, from some cause the black ants immediately disappeared entirely from the top of the earth in that vicinity. Not so on the battle-ground. The victors occupied the ensanguined field, and were busily employed for several hours. Many of them were attending to the wounded, which were numerous, and whom they carried into the shade of a large clod of earth, that had been turned up by some heavy road wagon, to get them out of the scorching sunshine, which was pouring down in great force, it being now nearly 11 o'clock. Much the larger portion of them were gathering up and packing off the decapitated bodies of the black ants, and carrying them up a post oak tree, in which they had their city, and which also stood near by. Upon these headless victims of the bloody strife they intended, as I supposed, to have a grand feast.

There was a great running to and fro by those who were attending the wounded. They seemed to exert themselves greatly and to manifest much sympathy for them. In the course of an hour many of the wounded were so far recovered as to be able to travel, while those who remained invalid were carried up the tree by their friends. Although great numbers of the red-heads were wounded, and some of them seriously, there were but few dead ones, and these were carried up the tree with the headless trunks of the conquered foe. After the victorious red-heads had left the battle-field, the only signs that remained to mark the place of the destructive contest was the dissevered heads of the vanquished. Of these there were so many that they suggested the idea of gunpowder strewed along the ground.

The food of this species of insect is various. He is quite fond of vegetable oils, sweet saps and honey. He collects his sweets from the tender buds and glands and blooms of plants, and in great quantities from the aphis —vine fretter or plant louse. These plant lice have their inflected beak inserted in the tender bark of the buds and twigs of the growing plants, vines and the like, where, in dense crowds they cling, sucking the sweet sap. Among these masses of plant lice is ever found great numbers of the erratic

ants, carefully and gently walking through the ranks of the sap-sucking pests; busily engaged in licking up the honey dew, which is nothing more than the transparent excrementitious fluid, that is momentarily dropping from the countless aphides. To facilitate the process of collecting these precious sweet drops, the ant caressingly applies its antennæ to the bloated sides of the plant louse, who obligingly turns up his tail and delivers the sweet little transparent drop, which is thankfully received and licked up by the polite little teaser. From observations on this peculiarity in the character of the erratic ant, have originated the occasional accounts we have seen published in the newspapers about the ant's milk cows. As far as my observation goes, the erratic ant is the only one of the genus that visits and collects the excrementitious droppings of the aphis.

Besides the great quantities of food collected from the aphis, or plant lice, by these courageous and extremely industrious little creatures, the oak family of trees affords them large supplies. The post oak (*Quercus obtusiloba*) and the black-jack (*Quercus nigra*) particularly. They will travel a long distance from home to visit a thrifty-growing tree of either of these oaks. And, as these trees yield their supplies all the time of the green foliage, they generally establish a chain of depots along the line of travel, from their nearest city to the food-giving tree. Or it may be, that finding the selected tree capable of supplying food for great numbers, they have, instead of depots, extended their cities along the range of the great thoroughfare, and thus, by the addition of city after city, strengthen the confederacy, and increase the facilities for procuring provisions for their great and extended realm.

This is no fiction, or fancy sketch, in the history of the contrivances of these thoughtful little emmets. It is sometimes a hundred yards or more from the mother hive, or city, to the tree that their commissaries have selected; and at various distances along the road, they do erect new establishments, at first, thinly scattered on the route, which are, however, seen to increase annually all the way to the tree, if it remains alive,—and these are either depots, places of deposit for their surplus accumulations of their stores of provisions, or they are confederated communities. Be it either way, the fact that they are carrying on a well-regulated and thoroughly-understood system of friendly, reciprocal intercourse cannot be denied; that is, as far as any one line of depots, or cities, as I prefer to call them, are concerned.

Coming across any one of their great thoroughfares we find them streaming along in both directions. Take either end of this road, and you may trace it to its terminus. It may be some distance, but you will find it if you persevere, either in a terminal city, or a live tree; and that it is not connected with any other range of cities, (I prefer the term cities), which, as I think, further and more careful investigation will decide these peculiar ranges of ant nests to be.

In large towns and cities constructed by the human species, where they have cut down and destroyed the forests, these sagacious little ants would have to evacuate such places, if they possessed no reasoning powers to enable them to adapt themselves to other conditions and circumstances. The ant finds that the march of civilization has crushed out and destroyed all his resources for subsistence; and viewing arrogant man as the prime cause of this great loss, he quickly decides to hold him accountable, and force him to make good the damage. To effectuate this grand retaliative resolve, he forthwith transports his eggs and young ones, with their nurses and teachers into the intruder's kitchen, into the little crannies and cracks, in the timbers about the dairy and dining apartment, and particularly beneath the hearths in the dwelling. In these newly-established homes they become more thrifty than they were while in a natural state. Finding provisions abundant and very convenient, they are encouraged to labor more, and they increase at a ratio unprecedented. Soon their numbers are so great that they are to be seen in

all portions of the house, sucking and carrying away every thing greasy or sweet that is not hermetically sealed. They cut and destroy window curtains and articles of clothing that are starched.

One way to destroy the erratic ant, is to lay out a greasy rag or recently laid aside greasy bone. By either of these experiments multitudes of them will be attracted, and when sufficient numbers of them have collected on the bait, hold it in the flame of burning shavings or other quick combustible, repeating the experiment frequently. But if the bone or rag be left undisturbed, it will not be long until they have extracted every particle of the oil from it; and should there be any scraps of flesh remaining on the bone when it is cast aside, it will be found that in a short time, they have cut the flesh to pieces, and after extracting the oil it may have contained, dropped it down in the form of dry powder, showing conclusively that they do not subsist on flesh, or dry food. They treat the kernels of any of the oily nuts in the same way. Hence I conclude that they subsist on a fluid diet, and that they, like the honey bee, are provided with an internal sack, or pouch, in which to transport their stores to the cities.

This day, 22d August, I observed the erratic ant in great numbers, carrying something in their mouths, and, as it was a visible something they were packing home, I was curious to know what it might be. So I robbed a couple of them of their freight, which, on being exposed under the microscope, turned out to be the carcass of the smallest—almost microscopic—black ant, the No. 7 of my catalogue. After making this discovery, I examined quite a number of them, and found the abdomen of all alike torn open and emptied —disembowelled. They were bringing them from beneath the cook house, where the poor little fellows had been filling themselves with waste syrup that had been spilled there. This circumstance had been discovered by some of the spies of the erratic ants, and now, as it had been licked up by the little ants, there was no way left for them to possess themselves of the rich treasure but to wage war upon the smaller ant, and tear it out of their full sack. And this they had already accomplished before I discovered them, and were now carrying home their lacerated carcasses, to have them sucked and dried of their blood and other contained fluids.

This type of ants is very numerous, courageous, and exceedingly thrifty and belligerent. He will engage in battle with any of the other types. They occasionally succeed in capturing the large, red, agricultural ant. (*Myrmica molefaciens*, S. B. Buckley.) I did not know then how they had managed to take him; but they had one of these big red fellows very secure when I first discovered them, and were making a great parade around him. They were clinging two or three to every leg of the large ant, and great numbers were parading and ranting on each side of the road, as they slowly and laboriously moved along with their giant captive, who seemed to be not only in great distress, but very loathe to be carried in the manner and the direction they were so unceremoniously dragging him along. The little black warriors had already deprived him of two or three of his feet, and they were sawing away at the remainder of his legs and feet, whilst *he* was clinging with his large jaws to a piece of oak leaf; and that the little black fellows were hauling him, leaf and all, to some terrific fate, was manifested by the prisoner in all his actions. I had not time then to wait and see how the affair terminated. Since that case, however, I have witnessed a good many similar ones. It occurs quite frequently.

The agricultural ant, in his foraging excursions, travels over a wide range, and will not turn his course for anybody. So, when in his course, he falls into a range of confederate cities of the erratic ant, he walks on as carelessly among them as if there was no one at home; and, as a general thing, the sagacious little braves suffer him to pass unmolested, paying but little attention to him. But sometimes he meddles too much, and, putting on airs, contrary to their notions of propriety, they consider it a national insult, and

instantly, all that portion of the confederacy are up in arms. Large companies attack him forthwith. It is, however, always a dangerous experiment, and very often results in failure. At the best, there is to the erratic ant, in these cases of daring, great loss of life. When they make the attack, the giant intruder, at first, seems to regard it as an affair of a trifling nature, and with but little concern, strikes about amongst his diminutive assailants without any apparent anxiety. He occasionally snatches up one of the most venturesome, and, as if to frighten the rapidly-increasing hordes, or to show off his great strength, he breaks the backs or heads of half a dozen or so, but does not kill near as many as he might.

The news of this giant invader of the confederacy soon spreads to every city, each of which sends out its quota of warriors; and it is surprising to note how promptly and with what haste they stream along on the road to the troubled city. The field around the red monster begins to blacken with the accumulating regiments of the invaded nation; and now, when it is too late, the great red monster begins in earnest to crush and slay every one that comes in range of his death-dealing jaws; and, by means of his great strength and power to crush and destroy every one upon whom he can clamp his ponderous jaws, he often succeeds, with the loss of one or more of his feet, perhaps, in extricating himself from the dangerous thraldom. But more frequently, the daring little blacks pitch into the strife in such multitudes, and seizing him by every foot, and leg, and horn, and weighing him down by their numbers, overturn him, clip off his feet, gnaw at his throat, saw at his waist, and, finally, in the course of half a day, succeed in rendering the giant foe harmless. And now, with a grand display of their numbers, they drag the now helpless victim about in triumph for a time, and then as many as can get a hold of the dying red ant pierce him in the joints of his coat of mail, and suck from his trembling, agonizing, prostrate body all the vital fluids, leaving the perfectly-dry skeleton on the plain, as a warning to all such adventurous intruders.

About the first of October, or as soon as the atmospheric temperature begins gradually to lower, the thoughtful little erratic ant, who is, indisputably, a practical meteorologist, goes diligently to work, deepening his habitation. A knowledge of the meteorological indications obtains with all the species of the ant genus. Hence, we find that, during the summer season, they throw out from their cells only black dirt—soil; then they are excavating apartments near the surface, both for convenience to the foraging laborers, whose duty it is to bring in the supplies, and to obtain a higher temperature for the purpose of hatching and nurturing the young. But, as soon as the signs of approaching winter supervene, we see them throwing up clay, and, among the larger types of the genus, borings of the limestone rock, even. Thus we learn that they are preparing cells or apartments at a greater depth. With a perfect knowledge of their physical powers of resistance to the atmospherical changes which are to take place during the winter, they construct their winter quarters. Accordingly, if we take pains to ascertain the truth by examining the facts for ourselves, we shall find them excavating their winter apartments at a depth below the line of change—to where the temperature is uniform at about 48° Fahrenheit. Here, with the addition of the vital warmth of the swarm, the temperature of their winter quarters maintains an uniform heat of about 69°. In this the community remains comfortable and active throughout the season of inclement weather.

16*th March*, 1862. This was quite a gala day with this species of ant. At all their holes everywhere in this vicinity, might be seen great numbers of their diminutive, white-winged queens frisking about, around the entrance to their cities, in a very antic style. All the drones, or male ants, were out, too, running very rapidly to and fro, chasing the queens, who suffered themselves to be overtaken, receiving the embrace of their lovers quite naturally and very often. Many of the neutrals were out also, who were engaged in trans-

porting their eggs and young ones, in all stages of growth, from one hole to another, running rapidly with the tender, maggot-like looking things, to prevent them, as I thought, from being injured by the sun, which was hot for the season. Others, again, who were not carrying the young, would dash up behind the nearest queen, and, in a playful manner, seize her by the extreme tips of her folded white wings with his calliper-like mandibles, raise her from the ground, and rush headlong into the nearest hole with her. The queens did not seem to relish this piece of rudeness, but they submitted to it with good grace, and soon came frisking back to their lovers again. I saw hundreds of them carried forcibly into their holes, in the same playful style, by the workers, who, not unfrequently, snatched them rudely from the embrace of the males. The males or drones of the erratic ant, unlike most of the other species, have no wings; on which account it becomes necessary for the queens to receive their embraces previous to taking their flight, which they all do instantly, after they are satisfied with their lovers.

The queens or mother ants of this species are not more than half the size of the workers and nurses of the cities to which she belongs. She is not so large as a small flea, and yet she takes her aerial voyage alone, and, if the wind is strong, she may continue her flight many miles. When she descends to earth again, she immediately cuts off her wings, which are no longer useful, and goes to work to establish a new city.

Just think of the great powers possessed by this small, almost microscopic insect. Let us recount some of her known attributes. Poised on her tiny white wings, all alone, and charged as she is, in embryo, with myriad nations and kingdoms of her species, destined to flourish and perform their parts on the future life stage, in the grand conflict for subsistence, confidently commits herself to the swift winds, and, while in search of her new home, she continues her aerial flight, perhaps, for hundreds of miles. She lights at last, however, and, cutting away her wings, which are no longer necessary, commences the work of excavating and preparing cells and apartments for the coming generations. And now, supposing it to be true, that this is the only ant of that species on the face of the globe, such is her wonderful prolific powers, that it would require but very few short years for her to re-produce, and fill our yards, and paths, and hearths, and sugar barrels, as thickly with the countless millions as we now find them.

The deaths were announced of the following members: Mr. Augustus Fiot, of Bethlehem, April 5th, and Mr. Robert E. Griffith, and Col. Robert Carr, Correspondent.

April 17th.

MR. VAUX, Vice-President, in the Chair.

Twenty-six members present.

The deaths were announced of the following members: Mr. John P. Crozer, March 11th, and Mr. Roland E. Evans, April 14th.

April 24th.

MR. VAUX, Vice-President, in the Chair.

Thirty-one members present.

The following gentlemen were elected Members: Mr. John B. Parker, Joseph Thomas, M. D., Mr. Josiah Hoopes, Mr. Charles

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S. Lewis, Mr. Tryon Reakirt, Mr. Edward K. Tryon, Jr., Rev. George D. Boardman, Lemuel J. Deal, M. D., R. L. Webber, M. D., U. S. N., Mr. Samuel R. Shipley, Mr. William Sellers, and Mr. Joseph Walton.

The following were elected Correspondents: Prof. Alfred DuBois, Colorado, Mr. Jacob Stauffer, Lancaster, Pa., and Dr. J. H. Baxter, U. S. A.

May 1st.

MR. CASSIN, Vice-President, in the Chair.

Twenty-five members present.

The following was presented for publication:

"Notes on some members of the Feldspar Family." By Isaac Lea.

May 8th.

The President, DR. ISAAC HAYS, in the Chair.

Twenty-four members present.

Dr. Ruschenberger stated, in relation to the fossil fish-scales presented this evening, that Col. James Greer, of Dayton, Ohio, had found them, March 19, 1866, with the bones of the head, ribs, vertebræ, &c., of the fish, about two miles north of Vicksburg, Miss., on the river side of Fort Hill, about two hundred feet above high-water mark, in the escarpment of a narrow road-way, imbedded in the solid earth in a direction from north-west to south east, four feet beneath the top of the bank or surface. Dr. Leidy supposes these scales to be identical with those of an existing species of the Mississippi.

May 15th.

MR. VAUX, Vice-President, in the Chair.

Thirty-one members present.

The following were presented for publication:

"On the Structure and Distribution of the Genera of the Arciferous Anura," and "Fourth Contribution to the Herpetology of Tropical America." By E. D. Cope.

"Description of five new species of Unio," and "Description of two new species of Lithasia." By Isaac Lea.

"Observations on the Cranial Forms of the North American Indians." By J. Aitken Meigs, M. D.

Mr. Benjamin Smith Lyman observed: I have the honor of presenting to the Academy a fine Slickenside in the carboniferous conglomerate, found at Plymouth, Luzerne County, Pennsylvania. The Slickenside covers a surface of irregular shape, eight inches and a half long in the longest part and sixteen inches wide; and is very smoothly and straightly grooved, evidently by the rubbing of one portion of the rock upon the other. It has struck me as interesting chiefly on account of its giving a perfectly satisfactory explanation of what have been sometimes taken for fossil calamites that had impressed themselves upon the quartz pebbles of the conglomerate so as to flatten and groove them. Such impressions were mentioned by Professor Jehu Brainerd of Cleve-

land, in a paper read before the Cleveland meeting of the American Association for the Advancement of Science, and published himself the next year, as a principal argument in favor of his theory of the formation of sandstones, and even conglomerates, solely by chemical deposition. He supposed the pebbles to have been deposited in a gelatinous state at first, so as to be capable of receiving the impressions of plants; and he gives a figure of such an impression resembling a calamite or a coarse conglomerate with the surface of the pebbles quite flat. I was puzzled by a similar detached fragment of a slickenside in the conglomerate near Beaver Meadow, in 1859; but this specimen, from its size and completeness, explains perfectly both that one and the one figured by Professor Brainerd.

Aside from the striking extravagance of Professor Brainerd's theory, and from this specimen's refutation of one of his best arguments, another argument against him, furnished by his own figures, may perhaps properly be mentioned here. A gelatinous pebble flattened by pressure on one side would, manifestly, be distorted on other sides, and a number of such pebbles lying side by side, affected by the same pressure, would have analogous distortions. In Professor Brainerd's figure of the so-called fossil calamite, the pebbles flattened on one side show no such distortion, but retain on every other side their rounded, water-worn look; so that the general appearance is, in effect, that of pebbles cut in two, instead of flattened down by pressure. The same can be said of the pebbles in his figure of the conglomerate resting with flat bottomed pebbles on the soft red shales, which he says is a very common occurrence, and which forms his other best argument in support of his theory.

The death was announced of Mr. J. Pemberton Hutchinson, Member, on May 9th.

May 22d.

MR. VAUX, Vice-President, in the Chair.

Thirty members present.

The following were presented for publication:

"Monograph of the Procellaridæ." Parts IV. and V. By Elliot Coues, M. D.

"On the Introduction of the Shad into the Alabama River." By Prof. W. C. Daniel.

Dr. Le Conte made some remarks on the subfamily Clavigeridæ, of Coleoptera.

He described briefly the structure and habits of these insects, and pointed out the distinctive characters of the three described genera, Claviger, Adranes and Articerus, to which he added a fourth, Fustiger.

This new genus agrees with Articerus in having eyes, but differs in the structure of the antennæ. These organs in Articerus are broad, without distinct basal articulation, but in Fustiger consist of a long subconical mass, gradually broader externally, truncate, and covered with a sponge of hair at the tip, and marked with four or five indistinct transverse sutures, showing that it is composed of closely connate joints; between this subconical mass and the head is a distinct short basal joint, projecting beyond the fovea in which the antenna is inserted. The eyes are oval, situated on the sides of the head, and composed of seven or eight moderately large lenses. The tibiæ are not dilated as in Articerus.

The four genera thus form two series, of two genera each:

A. Eyes wanting:

Antennæ 6-jointed..... Claviger.

Antennæ with a long homogeneous club, and two short basal joints..... Adranes.

B. Eyes distinct, composed of a few aggregated lenses:
Antennæ with one short basal joint, and a long club having traces of transverse sutures..... Fustiger.
Antennæ (? without basal articulation), with a broad club of homogeneous structure..... Articerus.

The distribution of these genera is peculiar: Claviger is found in Europe and Asia; Adranes in North America; Fustiger in Brazil, Syria and North America; while Articerus, with the exception of a species found in Copal, is confined to New Holland.

The species of Fustiger are: 1. F. brasiliensis, (*Articerus braz.* Westwood, Trans. Ent. Soc. London, 2d ser. iii. 277, pl. xvii. f. 5,) from Brazil; 2. F. syriacus, (*Articerus syr.* Saulcy, Ann. Ent. Soc. France, 1865, p. 15,) from Syria; and 3. A new species from Tennessee, which will soon be described by Dr. Brendel, who is now occupied in studying the Pselaphidæ of the United States.

Westwood mentions, in the description of the Brazilian species, and exhibits in the figure the short basal joint of the antennæ, but does not allude to the obsolete transverse sutures of the mass of the antennæ.

Saulcy describes the structure of the antennæ very accurately, and it is owing to his observation that I have detected a very short and indistinct joint between the visible basal joint of the antennæ of Adranes, and the bottom of the frontal foveæ in which they are inserted.

Dr. Leidy remarked that Mr. J. F. Clew, one of the proprietors of the salt mine of the Island of Petite Anse, Louisiana, had that day called upon him, announcing the donation to the Academy of a mass of 150 lbs. of pure rock salt. Mr. Clew further informed him of an interesting fact in connection with the history of primitive man. The salt mines of Petite Anse were discovered during the late rebellion. A salt spring had been previously known to exist. During the war, as this failed to produce the amount of salt required, a well was sunk in the hope of procuring a greater supply. At the bottom of the well the workmen met with a solid rock which turned out to be pure salt. This is covered with about fifteen or more feet of soil, mainly composed of sand and mud. A specimen of this soil having been submitted to Dr. Leidy, he was surprised to find mingled with it grains of precious garnet and olivine. Mr. Clew stated that a number of pits had been opened to reach the salt. In several of the pits at the depth of ten or fifteen feet they discovered in the soil bones of the Elephant, well preserved, and beneath these, within a few inches of the rock salt, abundance of matting. Portions of this matting, exhibited to Dr. Leidy, were composed of a tough, flexible, split cane, and were plaited diagonally. The pieces were well preserved, and evidently specimens of human art. On being asked the question, Mr. Clew said he was under the impression that some stone implements had also been found in a similar position, but he was not certain. He further added, that at the sides of one of the pits, bones of the Elephant, and beneath them pieces of matting, could yet be seen, as they had been allowed to remain undisturbed. The facts were so interesting in connection with these remains, and the geology of the Island of Petite Anse, that Dr. L. thought a competent person should be sent there to make an exploration. Mr. Clew has offered every facility to any one disposed to undertake the investigation.

May 29th.

The President, Dr. Isaac Hays, in the Chair.

Twenty-six members present.

The following gentlemen were elected members:

Mr. Joseph R. Rhoads, William K. Gilbert, M. D., Mr. Samuel Huston, Mr. T. Clarkson Taylor, Robert S. Kenderdine, M. D., Mr. Daniel Haddock, Jr., Mr. Henry A. Dreer, Mr. Christian C. Febeger, Henry Stillé, M. D.

The following were elected Correspondents:

Rev. M. B. Anderson, LL. D., President University of Rochester, N. Y., and Mr. Lemuel R. Carter, of Paris Hill, Oxford Co., Maine.

On report of the respective Committees, the following papers were ordered to be published:

Notes on Some Members of the FELDSPAR Family.

BY ISAAC LEA.

I have been much interested for several years past in observing and collecting the varieties of the *Feldspar Family* of Chester and Delaware Counties in this State.

Finding in many places that, where the intrusive *Serpentine* appears, there were usually to be found the finest and more vitrious varieties of *Feldspar*, I visited all such localities, and thus have brought together, perhaps, more of them than any other mineralogist who has searched in these counties. My object in these researches has been solely as to their external characters, connected with the matter which gives to them color, so far as microscopical examination could enable me to effect it.

Among the numerous varieties which I have brought together, I think there are three which have not been before observed. One is of a compact structure, almost without cleavage, and of a fine green color, approaching, as regards tint, to aqua-marine, and is semi-transparent. Another, which usually accompanies the first, and often passes into it, as *Leelite* does into *Feldspar*, has always a definite and well characterized cleavage, the surface of which presents an agreeable pearly appearance, sometimes satin-like. This is usually white or grayish, sometimes inclining to a pale purplish hue, particularly toward the edges of the specimens, and which seem to have been enveloped in *Albite*. Along those edges where the purplish hue is stronger, I could, in all cases, detect small thin spangles or plates, such as constitute *Sunstone*,—*Aventurine Feldspar*—with reddish or wine-color internal reflections.

These reflections are minute, usually microscopic, and always, I believe, of a hexagonal form or the modification of that form.

For the green mineral, I propose the provisional name of *Lennilite*, having found it only near the village of Lenni, in Delaware County. For the *pearly* variety, I propose that of *Delawareite*, having first found it in Delaware County, among the *Serpentine* rocks, between Glen Riddle and Lenni. Subsequently, I found specimens in Chester County, near to West Chester.

The third is a variety of *Feldspar* which is more laminate and glassy, of a dull bluish green color and semi-transparent, which has through the mass usually very minute internal bright crystalline hexagonal plates giving very bright reflections. This is found at Blue Hill, about two miles north of Media, and is an exceedingly interesting mineral. I found a specimen very similar to this, but rather more blue, some three miles southwest of West Chester, which had not, however, any plates with reflections, but, with a high power, numerous small, black, thin, prismatic crystals were observable. For this, I propose the name of *Cassinite*.

It had been known for many years that *Sunstone* proper existed in the *Hornblend Rocks* of Chester County, near to Kennett Square. This I found in sufficient quantity and perfection to institute a good examination into the

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forms of these reflections. Under a high power, I observed perfect equal-sided hexagons, with nearly all possible modifications of that form, by more or less unequal replacement of some of the prismatic sides; thus, some assuming a triangular form, some that of rhombs and rhomboids; some of the latter being almost linear. These plates are sometimes imperfectly formed, the boundary lines being occasionally irregular and broken, exhibiting one, two, three or four sides, and sometimes no part of the sides present a right line. They usually lie parallel with the principal cleavage of the *Feldspar*, and, when the rays of light strike their bright surfaces, the reflections are exceedingly brilliant. Under the microscope, with a bright light, it will be observed that some reflections are blue, others green, purple, red and yellow. Some of the specimens of *Sunstone* show parallel lines on the edges of the cleavages parallel to the prismatic sides of the *Feldspar*, which are evidently occasioned by the regular deposit of the layers. These are quite different from the fine parallel minute striæ which lie on the principal faces of the cleavage, and which can only be observed with a high power. Neither of these are constant. These spangles or plates are so thin, that I have been unable to detect any perceptible thickness on their prismatic sides. These very interesting plates in *Sunstone* have been known for a long time, but I have not been able to find any analysis of them.* Kenngott states that they are Göthite, hydrated-per-oxid of Iron (Fe_3O_2HO). Sheerer says that "the *Aventurine* character is owing to minute particles of *Specular Iron*.† I doubt this, as the resplendant crystals are usually semi-transparent, reflecting various colors, as mentioned above. There are in most varieties another set of deposits, which are much rarer, and present opake, black masses, usually taking the same hexagonal form and its modifications, but often without any regular form. These may be of the same metallic substance in a different state of oxidation, not transmitting the rays of light.

Fine specimens of *Moonstone* are found in *Albite*, in Delaware County, west of *Media*, but this species of *Feldspar* does not give out its beautiful blue color by reflection from any foreign body, but by the absorption of all the rays of light but blue, and this owing to some arrangement of its atoms not yet understood.

In the examination of various *Feldspars* with high power of the microscope, I found in nearly every one which was not entirely white, that more or less foreign matter in a crystallized state, was included in their composition. In the green compact variety which I have described above, and proposed to call *Lennilite*, there was nothing detected, nor was there in the ordinary green *Feldspar* of Mineral Hill, near Media, except that in the latter locality there have been specimens found of a glassy structure, and with clear double cleavages, in which reddish spots were interspersed, which spots were always colored by the presence of these crystalline plates, having beautiful bright reflections, and of the usual hexagonal form.

I ought to mention here, in connection with these beautiful brilliant plates in *Sunstone*, that Prof. Rood, of Columbia College, New York, some time since, made a "Micro-Stereograph" of a thin plate of *Sunstone* from Arendal, Norway. In this he succeeded admirably in displaying these numerous modifications of the crystals, which were enlarged and photographed on paper; thus bringing those interesting forms with great perfection to the recognition of the unaided eye.

I proceed now to the results of my microscopical examinations of various *Feldspars*, in which I found more or less of these minute crystalline forms.

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* *Aventurine Quartz* is also called *Sunstone*, and is considered of some value as a stone of luxury, but it has not reflections as brilliant as those of *Feldspar*; nor are they, so far as I have been able to observe, crystallized plates, but their irregular deposits are of the same brown and red color, and they may be Göthite.

† Dana's Mineralogy.

In the dark, nearly black *Labradorite* of the Adirondac Mountains, there were only to be found dark, irregular, unshaped spots.

In the nearly black opalescent portions of *Labradorite* from Warwick, Orange County, N. Y., were very minute imperfect black crystals, while scattered throughout there are larger transparent, imperfect forms of irregular crystals, which have the appearance of being hollow points.

A rolled fragment of pale purple *Feldspar* from Easton, Pa., contained hexagonal plates, but generally these plates were found to be irregular and broken.

A *Black Feldspar* found near West-Chester—a small fragment nearly an inch square—was found to possess very thin prismatic black crystals, lying in various directions, but principally in one direction. There were also scattered throughout a few very black spots, some of which were disposed to take the hexagonal form.

Labradorite from Scotland, with a fine colored surface, presented minute reflections. Under a high power, a few brown hexagonal plates were observed, with very numerous black, attenuated, prismatic crystals, and some short thick ones.

A bluish lead-colored glassy *Feldspar*, from near West-Chester, presented acicular black lines all in the same direction. These were usually somewhat long, much more so than I have observed in any other specimens which I have examined. Occasionally an opake, black, rhombic crystal was observed.

A dark variety from Lenni, passing into *Leelite*, possesses very minute black, attenuated prismatic crystals.

Fetid Feldspar (Necronite?) from the Vanarsdale Quarry in Bucks County, Pa., has microscopic black crystals, imperfectly formed, but with a tendency to hexagonal form.

A *Salmon-colored Feldspar*, from near Lenni, was found to possess many elongate *black* rhomboids, and some few imperfect reddish hexagonal plates. One of the rhomboids is partly black and partly red, showing that the crystals of both colors are of the same substance.

A specimen of a darker salmon color, found by Mr. John Cassin, many years since, at the old Molybdena Mine, near Chester, Pa., has the appearance of *Perthite*, but there were no reflections to be observed in it, only presenting, occasionally, black masses. The deep color of this *Feldspar* arises from the close approximation of irregular opaque brownish masses.

A very pearly specimen of *Delawareite* found near West-Chester, contained rather large reddish plates and many opake black crystals, some elongate, others triangular, hexagonal, &c.

Among the pearly specimens of *Delawareite* from Lenni is a fine purplish one with blood-red crystals, which are much larger than usual, and one is much longer and narrower than usual. In one of the pieces I observed a black curved object which presented a serrated side, reminding one of the notches of a Graptolite. It is probably *Tourmaline*.

The remarkable fine *Sunstone* obtained by Mr. Jefferis and myself in Chester County, Pa., present under a high power a great number and variety of brilliant red crystals of a hexagonal form, and of every modification of this figure. The reflections of the surface of these crystals give beautiful colors. Occasionally in these specimens where the plates are numerous and close, an area may be observed without any color, being clear, but retaining the hexagonal form and its modifications, the area being surrounded by reflections of red, blue, &c.

In the very peculiar greenish blue, lamellar *Feldspar*, from Blue Hill, two miles north-west of Media, Delaware Co., I found very numerous, small reflections of the usual modifications of the hexagon. This is a very pure and glassy species, and is of rare occurrence. It is found in the *Serpentine* rocks, and presents an entirely different appearance from *Sunstone* proper, which is found

in the *Hornblend* rocks of Chester County, the texture of the *Feldspar* and the reflecting plates being peculiar. I propose for it the provisional name of *Cassinite*, Mr. John Cassin having first called my attention to this glassy, bluish-green *Feldspar*. The possession of the reflecting plates had not been observed until I had discovered it by an examination with the microscope, but which when pointed out may be seen by the naked eye.

A gray satin-like specimen of *Delawareite* exhibited no red reflections, but there were some small, black, microscopic crystals chiefly of very elongate hexagons; some were irregular and not long.

A green and red mottled *Feldspar* from Mineral Hill, near Media, presented reddish groups of reflections here and there throughout the mass. Under a high power these plates were observed to be of the usual modified forms of the hexagon, that of the rhomboid prevailing while the hexagonal form itself was found only in rarer instances. The color of these plates varied from a blood red to a pale wine red, and are very small and numerous. This is a remarkably beautiful mineral and is I believe very rarely now found. I have found a single specimen and the only other specimens I have seen, were found some thirty years since.

In the beautiful *Sunstone* of Chester County, near Kennett Square, I found many reflecting plates of various shades of red. These plates are very numerous and usually elongate rhomboids, but the hexagonal form and all its modifications are found of various sizes when examined with a high power. There were observed also many black irregular spots, and some of these had irregular hexagonal margins. Interspersed throughout could be seen very numerous short, black, attenuate, prismatic forms, much more numerous and approximate to each other than was the case with the reflecting plates.

The fine *Sunstone* of Arendal, Norway, presents very remarkable reflections of not very minute plates. The *Feldspar* is clear and pure, and these reflections numerous and very brilliant. The hexagonal form and its modifications are very perfect, and the color pure and translucent, varying from dark red to light wine color. Many of the rhomboids are very elongate. Occasionally opake black plates were observed, and the same may be said of other *Sunstones* generally.

Chesterlite, from Chester County Poor House, quite to my surprise, presented here and there hexagonal plates. In one specimen I detected a remarkably fine hexagon of a deep red color.

Perthite, from Perth, Canada West, is a very dark salmon-colored variety of *Sunstone*, and I found in it the same hexagonal form and its modifications, but the plates were darker in color. There were mixed with these some opake black ones, similar in density and form to those which are found in the *Sunstone* of Chester County.

In *Peristerite*, from the same locality, I found very numerous minute black crystals, generally elongate rhomboids, very like, if not the same with, common *Labradorite*, to which it seems to be very nearly allied.

Observations on CHAETETES and some related Genera, in regard to their Systematic Position; with an appended description of some New Species.

BY DR. CARL ROMINGER.

Chaetetes has, by its tubular structure and the transverse diaphragms, dividing the tubes, a strong resemblance to Favosites, and was for this reason generally considered to be a member of the Favositoid family.

In the following pages I shall try to prove this to be an error, and to demonstrate its immediate connection with forms which are considered to be Bryozoa.

It has been asserted that transverse diaphragms have never been observed

in the tubules of any Bryozoon, (Milne Edwards et. H. Arch. du Museum, tom. v. p. 278,) but some jurassic specimens of Heteropora in my possession exhibit with the utmost distinctness their tubules divided by horizontal diaphragms. It would be difficult to distinguish a vertical section of them, from a similar section of a Chaetetes, if the tube-walls of the first were not perforated by densely crowded, very minute pores, while the walls of a Chaetetes are imperforate.

Fisher, the author of the genus, informs us that the tubes of Chaetetes multiply by division, while other observers, in specimens believed to be Chaetetes, could only see a multiplication of tubes by lateral gemmation, and therefore, to avoid the difficulty, created the genera Stenopora and Monticulipora, for these specimens. Milne Edwards is, to my knowledge, the only one to affirm Fisher's observation to be true, (British Fossil Corals, p. 264,) but he does not specially designate the species on which he made his observations, and subsequently places all the species he formerly named Chaetetes, under the genus Monticulipora.

I know of only one fossil resembling Chaetetes, in which the tubes are multiplied by division; this is the genus *Tetradium*, whose tubes regularly divide into four parts, but there is no reason to suppose this to have been the type for Fisher's genus Chaetetes, nor seems it probable that Milne Edwards had it under consideration. The structure of Chaetetes is considered to be exclusively tubular.

If we observe the different forms of Chaetetes, we will find some with contiguous polygonal orifices, and thin intervening walls. Others we will see with the tube mouths rounded, only partially contiguous, and with a number of smaller angular openings dispersed between them. In still others, the orifices are circular, not in contiguity, and surrounded on all sides by smaller angular openings. A vertical section through these different kinds will, at first sight, not exhibit a corresponding variety of appearance; we find the whole corallum to be an aggregation of tubules, which are divided by transverse diaphragms; a closer examination, however, will reveal to us, in the last mentioned forms, two sorts of tubules: larger ones, more or less circular in the cross-section, with straight diaphragms at variable, sometimes quite remote distances; and smaller ones, which are angular, with more closely approximated diaphragms; but the different tube segments, cut off by the diaphragms, are not always so regular as the nature of a tube would require it; some are projecting over the others, and joining with the adjacent segments in zigzag lines, which is a sure evidence that we have no real tubules before us, but merely vertical rows of independent cells, which being crowded in between tubes, assumed themselves the shape of tubules.

An interesting family-mark, common to Chaetetes, and to a number of other genera related to it, are the peculiar maculæ noticeable on their surface. In specimens of prevalently tubular structure, these maculæ are constituted by aggregations of larger tubes than the others; at the same time we see the surface at these places frequently elevated into small monticules. In other specimens, where the intertubular cell-mass is well developed, these maculæ are contrasting with the other surface by their entirely cellulose structure, and it is not uncommon to see these spots depressed, instead of being elevated.

The orifices of Chaetetes are generally open, or exhibit some distance below the surface their diaphragms, which appear to be perfect. It is, however, not rare to find specimens in which the tubules are closed by opercula with a central opening. In specimens of *Chaetetes rugosus* and *ramosus*, from the blue limestone of Cincinnati, a part of the surface frequently has closed tubules; their appearance assumes hereby an entirely different character, which reminds one greatly of the ramulets of Melicertites from the Oolite formation. Also of *Chaetetes frondosus*, I have some specimens exhibiting opercula.

In the first two species the opercula are slightly convex, in the latter, concave, and with an excentric opening.

Several species are decorated with spinules, rising from the margins of the tube orifices, and from the interstitial spaces. One of these, which attracted the attention of Milne Edwards, induced him to create for it the genus Dekayia. This spinulosity is not a confluent character, and has, in my estimation, no more importance than the hairs of a plant have, in regard to its generic position.

The so called *Dekayia aspera* occurs in the blue limestone of Ohio and Indiana, in which several other spinulose forms are found. One of them grows in small ramulets, with somewhat oblique, very minute orifices; some of its specimens are entirely smooth, without showing any signs of detrition; in others the surface is raised in scarcely perceptible, obtuse nodules; and finally, some are found with a perfectly hirsute surface. Also some specimens corresponding with McCoys *Nebulipora lens*, are decorated with quite prominent spinules; likewise some larger hemispherical masses, considered to be *Ch. petropolitanus*, and a species similar to *Chaetetes frondosus*.

From the shales of the Hamilton group of New York and Michigan, I know also several species of spinulose Chaetetes forms.

The stellate form of orifices, which is least expected to be seen in Chaetetes or in a Bryozoon, nevertheless is represented in some species of the Chaetetes family.

A few specimens found at Cincinnati, which in all particulars agree with *Chaetetes frondosus* have from three to five longitudinal ridges projecting into their tube cavities, by which the orifices acquire a floriform shape. In other specimens of the same species the orifices are round, without any traces of stellate character; even in the mentioned specimens, not all orifices are stellate. The stellate orifices of *Callopora florida* are made known by Hall; several other species of it are of the same character, and also in the genus *Fistulipora* we will meet with floriform orifices.

The question now is, have we to consider this stellate character as a serious objection to the bryozoic nature of Chaetetes and the allied genera?

I think not, for two reasons: 1. This radiate structure cannot be the exponent of a character which is essential to these organic beings, or it would be invariably developed. 2. These projecting lamellæ are not the equivalent of the radial organs in corals. Their number is not constant enough for that, and their distribution indicates frequently an unsymmetric bilateral, and not a radial plan. In some species there are only two such projections on one side of the tubes, while the other side is smooth; in others, with a larger number of lamellar projections, they generally form two opposite groups, and are rarely found disposed at equal distances around the circumference.

The relations between Chaetetes and some acknowledged bryozoic forms of the paleozoic era are so great, that if radial structure should be considered incompatible with the polyparium of a Bryozoon, I would rather remove the whole assemblage from the bryozoa, than to separate Chaetetes and some others from them.

In the blue limestone of Madison and Richmond, Ind., a well marked form of Chaetetes is found in abundance, which I do not see described. I propose for it the name *Chaetetes quadratus*.

It grows in coarse ramifications, with an even or slightly monticulose surface. Tube orifices vary in size in different specimens from one-fourth to one-third of a millimeter; those on the maculæ are somewhat larger; they are contiguous, polygonal or quadrate, separated by thin walls. Intertubular cells entirely wanting.

The quadrate tube form is particularly obvious on the terminal surface of branches, or on transverse sections. On the sides of the branches the quadrate tube form gives the surface a fanciful appearance, which I cannot bet-

ter explain than by comparing it with certain decorations of watch cases, consisting of concentric circle lines crossing each other. *Chaetetes pavonia*, with the synonyme *Ptylodictya pavonia* D'Orbigny, is described by Milne Edwards amongst the Chaetetes forms of the Cincinnati limestone.

This species has indeed a great resemblance to the group to which Ptylodictya belongs. It grows in double, thin laminæ, separable in two folia, which have on the inner side a dermatic concentrically wrinkled and striated crust, exactly similar to the separated leaves of Ptylodictya. The tubes begin with prostrate, thin walled ends, and become rectangular to the surface, by abruptly bending upwards; the erect part of them exhibits very thick walls. The orifices are contiguous, slightly dilated, and arranged in undulating rows, which, crossing each other under oblique angles, make their outlines more or less regularly rhomboidal. The outlines of the single tubes, however, are polygonal, and may be plainly distinguished in the centre of the massive interstitial spaces. Diameter of tubes one-sixth of a millimeter, somewhat larger on the monticules, which are little elevated and are disseminated over the surface at a distance of three or four millimeters. No diaphragms observed. Intertubular cells wanting.

This species would be entirely in correspondence with the genus Phænopora of Hall, but the entire absence of intertubular cell-mass, which is always, to some extent, developed in the species of Phænopora, is a difference of some importance, which, however, will be diminished, after we have seen in Chaetetes species with abundant intertubular cell-mass, and other species composed of tubules alone, with all intermediate forms placed between them. It is also to be noticed, that all the specimens of *Chaetetes pavonia* which I have seen, appear to be the terminal explanate ends of the fronds, while at the basal ends the cellulose tissue may be developed to some degree. This is decidedly the case in a small ensiform bryozoon of very similar structure, and occurring in the same association. The pointed basal ends of these specimens have a large proportion of cell-mass entering into their structure, while the upper portions are almost exclusively tubulose.

CHAETETES DECIPIENS, NOV. SPEC.

Occurs in association with *Ch. pavonia*, to which it is so surprisingly similar that, even for an experienced eye, it becomes almost impossible to distinguish the two species without the help of a lens.

It grows in entirely similar thin double leaves; the surface is covered with the same sort of monticules, composed of larger tubules; the orifices are similar in size and distribution, but a closer examination will reveal sufficient constant differences between the two.

The latter species has an abundant cell-mass interposed between the tubules; its tube-walls are thin, with not dilated and not contiguous orifices; the two leaves composing the laminæ are not so clearly defined, and not separable, and on vertical sections the vesiculous cell-rows interposed between the tubules, which themselves are also sometimes septate, will distinguish it at once.

The thick tube-walls in the one, and the intertubular cell-mass in the other, will produce on the naked eye a similar impression, which disappears under the magnifier.

This species has likewise much similarity with *Ch. frondosus*, but it is more delicate in all respects, and in *Ch. frondosus* the intertubular tissue is considerably less developed, its tubules being usually in immediate contiguity.

The genus *Callopora* of Hall, comes so near to Chaetetes that it may be well characterized at once, by saying it is a Chaetetes with abundantly developed intertubular cells. *Chaetetes Fletcheri*, (Milne Edw.) for instance, is in all particulars a Callopora.

The opercula, described by Hall in *Callopora elegantula*, are of the same general form as in Chaetetes, but a peculiarity of them is, some five or six

elevated ridges, radiating on the surface of the opercula, from the margin of the central opening to the outer circumference. In a species of Fistulipora, subsequently to be described, I found opercules of exactly the same structure. Also some species of Callopora, with a spinulose surface, are made known by Hall, which exhibit no essential difference from the spinulose species of Chaetetes.

The floriform orifices of *Callopora florida*, Hall, and *laminata*, Hall, have been occasionally mentioned before. The same stellate character of the orifices is developed in a species from the carboniferous limestone of La Grange, Missouri, (Keokuk Limestone.)

CALLOPORA MISSOURIENSIS nov. spec.

From an incrusting basal expansion branching nodose stems grow up. Diameter of stems four or five millim., orifices one-eighth of a millim. wide, distant from two to four of their own diameters. Form of the orifices sometimes only slightly sinuose, but in some finely preserved specimens, having the form of a five-rayed star, with a spinula on each of the inward projecting angles.

The intermediate spaces are filled with open angular cells, much smaller than the tubules. In vertical sections the tubes do not exhibit any diaphragms; the intertubular cell mass forms very regular vertical rows, having the appearance of septate tubules.

The genus *Trematopora* Hall, naturally succeeds Callopora. The principal differences from the latter genus are the elevated rims of its tube orifices, and the generally closed interstitial cells, which are less similar to tubules than in Chaetetes, and show decidedly their vesiculous nature. The tube diaphragms are not often developed, but there is no difficulty to find specimens in which their existence can be demonstrated.

Not all species united by Hall in the genus Trematopora properly belong there; for instance, *Trematopora sparsa*, *striata*, and others. On the other side, I think several species ought to be united with it, which are placed in other genera; as *Ceramopora foliacea*, *Diamesopora dichotoma*, etc.

McCoy's species of Fistulipora seems to have exactly the same structure with Trematopora, but McCoy had much less correct ideas of the affinities of his genus than Hall had; the latter expressly states the similarity of Callopora and Trematopora with the Bryozoa, and was only prevented from giving them their proper place by the existing prejudice, that the tubules of Bryozoa never have any diaphragms.

I take Trematopora and Fistulipora as being identical, and will use the name Fistulipora in a more extended sense, applying it to all the species which agree with it in anatomical structure and general surface characters, without to inquire specially at this place, how far a division into some subgenera, would be practicable.

Fistulipora is represented by a considerable number of species, during the whole paleozoic era. A striking feature of nearly all its species are superficial maculæ, analogous to those of Chaetetes; they are of exclusively cellulose structure, and have frequently a subregular stellate form.

A fair representation of these maculæ is given (Arch. du Mus. Tom. v. Tab. 20, f. 5,) in the figure of *Chaetetes Torubiæ*, which itself is, to all appearances, a Fistulipora.

The projecting tube margins of Fistulipora are in most of its species oblique to the surface, although the tubes themselves have generally a rectangular position to it, excepting the smaller ramose forms, and the earlier stadia of growth in laminar expansions, where the tubules are prostrate in the beginning, but soon elevate themselves under an abrupt angle and become rectangular.

The tube orifices are generally circular, or oval, but sometimes sinuate, or even stellate, like those described in Chaetetes and Callopora. Also opercu-

la, of similar structure to those of the former genera, are sometimes noticed in specimens of Fistulipora. The central opening appears to have been closed in some of the opercula by a subsequent solid deposition; we find, at least in all the perfect opercula, the central portion forming an offset from the surrounding marginal part.

Fistulipora is quite polymorphous; we find its species incrusting, and in free expansions, with orifices on one side only, or in double leaves, with orifices on both sides; they grow in hollow stems, or in strumose cystical form, or in solid ramifications, or in undefined large masses.

One, or several, of these forms are generally significant for a certain species, but I think, in the systematic arrangement of the Bryozoa, too much weight has been given to their external form and to the manner in which they grow.

For further elucidation of my general remarks, I will append the description of a number of species of Fistulipora which are new, or whose anatomy was not *fully recognized before.*

Hellipora (Constellaria) antheloidea,

Is the oldest and at the same time the most marked form of Fistulipora.

Its circular tubules with projecting rims, the vesiculous interstitial cell-mass, the monticulose maculæ with a star-like depressed cellulose centre, represent, in ideal perfection, the principal characters of the genus.

In this place I take occasion to mention a lower silurian fossil, whose nature is only imperfectly known, and which resembles in its structure Fistulipora.

Stromatocerium rugosum Hall.

By its external appearance, it has been generally confused with Stromatopora, but this latter has a widely different structure and belongs to the Petrospongiæ.

Stromatocerium rugosum grows in large subglobose masses with an undulated monticulose surface. Vertical sections show a series of superimposed laminæ, on which the naked eye can scarcely recognise organized structure; under the magnifier we find it composed of small, subparallel, simple tubules, and of a comparatively coarse vesiculous cell-mass surrounding the tubules. These cell-vesicules are convex above, concave below, spread out in horizontal layers, and not in vertical rows; the size of the vesicules is very unequal and varies from a half to one millimeter in the horizontal direction, about half as much in the vertical sense.

Diameter of tubules one-sixth of a millimeter; distance between each other about half a millimeter.

The more delicate surface characters cannot be recognized, on account of the unfavorable state of preservation of the specimens.

According to Hall, it is found in the Black River limestone. My specimens are from Madison, Ind., where it occurs in association with *Favistella stellata*, in the upper strata of the Hudson River group formation. Some of the best specimens, however, I found in the drift deposits of Michigan.

The Clinton group, and, in particular, the Niagara group, contain a good many species of Fistulipora structure—the *Trematoporas* of Hall.

In regard to a few of them, I have to make some remarks.

Trematopora tubulosa of the Clinton group, and *Diamesopora dichotoma* of the Niagara group, combine exactly the same internal structure with their external similarity of form.

The inner face of their hollow stems is covered by a delicately-wrinkled dermatic crust. Their tubules are arranged in oblique rows, becoming somewhat irregular by the slightly-developed maculæ. The basal portions of the tubules are prostrate, and in immediate contiguity; but, by abruptly bending up to the surface, leave a more or less considerable space between the erected tube ends, which is filled out by cellulose tissue. This cell-mass is generally found homogeneous, and allows no discrimination of cells. A

few specimens, however, may always be found which exhibit with sufficient distinctness the outlines of the tissue vesicules.

Trematopora tubulosa could, for this reason, with propriety, be placed under the genus Diamesopora; but Diamesopora itself, again, so much resembles *Trematopora ossiolata*, that I would rather see the genus Diamesopora given up, by amalgamating its only representative with Trematopora.

The species named by Hall, *Ceramopora foliacea*, is, in all respects, correspondent with the other Trematoporas. It grows in double leaves, which may be separated in two folia, with a dermatic crust on the interior face of the two leaves. Its tubules are, as in the former species, prostrate, and make an abrupt bend to the surface; the inter-tubular cell-mass exhibits its structure with the greatest distinctness.

Diameter of tubules one-sixth of a millimeter. From *Ceramopora imbricata*, the type of the genus, it differs essentially. More natural would have been its combination with *Rhinopora verrucosa*, which has the structure of Fistulipora, and the exterior form in common with it.

In *Rhinopora verrucosa*, the maculæ are represented by elevated, branching and anastomosing ridges, which are lined with tube orifices of somewhat larger size.

FISTULIPORA NEGLECTA nov. spec.

Convex, undulating, laminar expansions of a few millimeters thickness, with a wrinkled epitheca below. Tubules one-fourth to one-third of a millimeter wide. with quite projecting, oblique, oval orifices, forming a sharp lip on the outer side, and gradually lost in the general surface on the inner side. They are arranged in closely-set subregular rows, which are interrupted by small, little conspicuous maculæ.

Locality. Waldron, Ind, and Rochester, N. Y, in the shales of the Niagara group.

FISTULIPORA HALLI nov. spec.

Undulated, free or incrusting expansions, with a wrinkled epitheca below.

Tubules one-sixth of a millimeter wide, orifices oval, with an abruptly-projecting lip on the outer side, and arranged in subregular rows, which keep a distance of about one tube diameter. Maculæ quite conspicuous, sometimes slightly elevated, of irregular substellate form.

This species has much resemblance to *Ceramopora foliacea*, but it does not grow in double leaves as the latter.

Locality. Waldron, Ind., Rochester and Lockport, in the shales of the Niagara group.

In the upper strata of the Helderberg group, and in the Hamilton group, Fistulipora is represented by numerous species. The smaller ramose forms, which are so frequently met with in the Niagara group, are rarely seen in this horizon; larger laminar expansions, or massive tuberoso-globose forms, prevail here.

FISTULIPORA LUNATA nov. spec.

It grows in tortuous thick laminæ, with a wrinkled epithecal crust below, or more frequently in distorted, very irregular masses, consisting of several laminæ, which are grown together with their epithecal sides. The tubules are not angular to the surface, with prostrate basal ends as usual. Size of tubules one-fourth of a millimeter. Orifices with moderately-elevated margins, rotundato-semilunar, with two dent-like projections into the tube cavity at the concave or flattened side, which continue as longitudinal ridges down the cavity of the tubes. Distribution of orifices without any apparent order; distance a little over their own diameter. Tube diaphragms sometimes developed, frequently wanting.

Intertubular tissue coarse-celled; cells arranged in subregular vertical rows.

Surface raised in small rounded monticules, with cellulose maculæ on the vertex; distance from the centre of one monticule to the other about four or five millimeters.

Locality. It is quite common in the limestones of Sandusky, Columbus, and other places, (upper Helderberg group.)

FISTULIPORA HELIOS NOV. SPEC.

A thin laminar expansion encrusting the stem of *Eridophyllum colligatum.* (Heliophyllum, *Dillings.*)

Orifices pustulose, one-sixth of a millimeter wide, distant from each other about two or three tube diameters. Maculæ large, depressed in the centre, from which irradiate depressed cellulose spaces, giving the surface an ornamental appearance, very similar to *Hellipora antheloidea.*

Drift specimen belonging to the corniferous limestone.

FISTULIPORA STELLIFERA NOV. SPEC.

Double leaves separable in two folia; surface raised in low monticules, distant about four millimeters from one centre to another.

Orifices linguiform or irregularly oval, one fourth of a millimeter wide in the larger diameter, surrounded by an elevated rim. A few larger and more projecting orifices are generally noticed on the monticules, from the summits of which narrow, cellulose, bifurcating spaces irradiate. In places to which these cellulose radii do not extend, the orifices are closely approximated.

Locality. Thunder Bay, Lake Huron, in the shales of the Hamilton group.

FISTULIPORA SULCATA NOV. SP.

Thin simple laminæ, with an epitheca below. Orifices one-fourth of a millimeter wide, irregularly linguiform, surrounded by an elevated margin, closely approximated and disposed without any apparent order. Maculæ having the form of elongate narrow foveæ, which send out some radiating furrows.

Locality. Partridge Point, Thunder Bay, Michigan, in the shales of the Hamilton group.

FISTULIPORA MINUTA NOV. SP.

Undulated laminæ, only half a millimeter thick, with an epitheca on the lower side, and raised in low rounded monticules on the upper face.

Tubules one-eighth of a millimeter wide, irregularly oval, distant from each other somewhat more than one tube diameter. Maculæ little conspicuous, on account of the minuteness of the fronds.

Occurs with the former at Partridge Point.

FISTULIPORA ACERVULOSA NOV. SPEC.

Large undulated expansions, from a few millimeters to one centimetre thick, and with an epithecal crust on the lower side.

Surface elevated in monticules of about five millimeters distance. Tubules one-fourth to one-third of a millimeter; of somewhat larger size on the monticules.

Cellulose maculæ only feebly developed.

Orifices rotundate, forming a prominent lip on the exterior side, equally distributed over the surface, holding a distance of a little more than their own diameter. Tube diaphragms distant, frequently wanting. Opercula with a central opening, sometimes developed. Intertubular tissue formed as usual by vertical rows of vesicules.

Locality. Partridge Point, with the former species

FISTULIPORA SPINULIFERA NOV. SPEC.

Grows in branches of two or three centimetres thickness, or also in thick undulated expansions.

Surface monticulose, distance from one monticule to the other three or four millimeters, summits of monticules cellulose. Tubules one-fifth of a

millimeter wide. Surface finely spinulose or granulose, exhibiting seemingly dilated polygonal orifices, but actually it is the luxuriant spinulose intertubular cell mass which forms the polygones, and obscures the tube mouths within its meshes. Occurs with the former species.

FISTULIPORA ERIENSIS nov. sp.

Undulated and distorted laminar expansions one or several millimeters thick, with a wrinkled epitheca below.

Surface spinuloso-granulose, raised in irregular low monticules, with a cellulose macula on the summit.

Intertubular spaces more or less elevated above the small projecting lips of the tube orifices, making the surface appear as if covered by expanded polygonal openings, as in the former species. Tubules one-fifth to one-fourth of a millimeter wide.

This species has much resemblance to *Fistulipora spinulifera*, but it does not grow in massive ramifications; its laminar expansions are more delicate, while, on the contrary, its surface has a coarser texture.

Locality. Shore of Lake Erie, near Hamburg. Shales of the Hamilton group.

FISTULIPORA UTRICULUS nov. spec.

Strumose branching utricules, or irregular cysts, with a dermatic crust covering the inner cavity. Large cellulose maculæ dispersed over the surface. Tubules one-sixth of a millimeter wide. Intertubular spaces and maculæ spinuloso-granulose. Orifices generally surrounded by a shallow depression, from which the tube margin projects under the form of a sharp lip. Distance of orifices about one tube diameter, excepting the cellulose maculæ. The three last-mentioned species are very similar to each other, but, aside of the different manner of growth, each one has some constant smaller peculiarities, which convince me of their specific difference.

Locality. Widder, C. W., in the upper strata of the Hamilton group.

FISTULIPORA CRASSA nov. sp.

Digitato-ramose, or undulated explanate masses, attached to other bodies or partially free, with a concentrically-wrinkled epitheca on the lower side. Surface raised in obtuse monticules, with more or less extended cellulose maculæ on the summits.

Tubules one-third to nearly one-half a millimeter wide, distant from each other one or a little more than one tube diameter, excepting the before-mentioned maculæ.

Orifices rotundate, slightly sinuate, surrounded by an unequally-elevated margin, which exhibits sometimes two dent-like projections into the tube cavity.

Tube diaphragms distant, or not developed. Intertubular tissue coarse. Opercula of usual form, sometimes noticeable.

Locality. Widder, C. W., in the lower strata of the Hamilton group, and in the drift deposits of Michigan.

FISTULIPORA ELEGANS nov. spec.

Thin laminæ, with a concentrically-wrinkled epitheca below.

Tubules one-third of a millimeter wide, prostrate at the base, rectangular to the surface at the upper end. Orifices perfectly circular, with an equally-projecting, crenulated rim distributed over the surface at a distance of about one tube diameter, excepting the cellulose maculæ, which, however, are not very conspicuous. Opercules very frequently preserved, flat, with a central opening, which in some is closed by a subsequently deposited globular solid stopper. In a few specimens, I see six elevated ridges radiate from the inner opening to the outer circumference, exactly as in the opercules of *Callopora elegans*. Intertubular cell-mass coarse, with angular cells as large as the

tubules. In some specimens, which are splendidly preserved, I see the roof of every interstitial cell perforated by a minute opening.

Locality. Shore of Lake Erie, Hamburg. Widder, C. W., in the Hamilton group.

The carboniferous limestone encloses, likewise, a number of interesting representatives of the genus.

FISTULIPORA SPERGENENSIS NOV. SP.

Undulated convexo-concave laminæ, or strumose utricules and cyst, with an epitheca on the inner or inferior side Tubules one-third of a millimeter wide, distant less than their own diameter. Orifices circular, surrounded by an elevated rim, which projects more on the outer side. Many specimens have no elevated tube margins, and exhibit interstitial spaces with open cells; but this is only owing to an imperfect state of preservation, or the effect of detrition. Surface raised in obtuse unequal monticules, with cellulose maculæ in the centre.

Locality. Spergen Hill, Ind. Warsaw Limestone.

FISTULIPORA FLABELLUM.

It is fixed to the ground by a prevalently-cellulose, thick basal expansion, consisting of concentrically superimposed layers. From this base, elevates itself a compressed, more or less elongated stem, which finally expands in a thin fan-like double leaf, fissible in two folia, with a dermatic crust on the inner face of each. This division in two laminæ goes through the whole stem, to the bottom of the basal attachment.

Tubules prostrate at first, and then bending rectangular to the surface. Width one-fifth to one-fourth of a millimeter. Distance of tubules more than one tube diameter, arranged in subregular rows, which are much interrupted by large, not elevated cellulose maculæ. No diaphragms observed. Orifices rounded or obtusely triangular, with a projecting lip, but more frequently not elevated above the surface, and without a lip. Intertubular spaces, if in good preservation, decorated with fine flexuose anastomosing striæ. Cell tissue usually appearing solid homogeneous, but in some better preserved specimens, of distinctly vesiculous structure, as in other Fistuliporas. In some specimens, the orifices are closed by slightly depressed opercula with a small opening.

Locality. Spergen Hill. Warsaw Limestone.

This species shows, by its mode of growth, a strong affinity to the group, which includes Ptylodictya, Stictopora, Phænopora, Clathropora, etc., which all do, in elementary structure, correspond with Fistulipora, being composed of tubules of the same configuration, and of an intertubular cellulose tissue. I find it strange, that no one describing these different-mentioned genera has stated the cellulose nature of this intertubular substance, although it forms an important and essential part of all these bryozoa.

FISTULIPORA TRIFOLIA NOV. SPEC.

From an incrusting basal expansion of prevalently-cellulose nature, triangular stems about one centimeter wide, with sharp edges and concave sides, grow up. From the surface of these, new three-edged folds elevate themselves, and prolongate into stems, whereby a very peculiar sort of ramification is produced. Each triangular stem is composed of three leaves, grown together with their inner sides, forming a three-edged central suture line, from which the tubules begin in a prostrate position, but soon become rectangular to the surface of their respective leaves.

Surface generally appearing worn, with not projecting round orifices one-fifth of a millimeter wide. In perfect specimens they are surrounded by an elevated rim. Distance of orifices about two tube diameters. Intertubular spaces where not worn, exhibiting the elevated angular outlines of the cells.

Quite conspicuous, not elevated maculæ are distributed over the surface.
Locality. La Grange, Missouri. (Keokuk Limestone.)

FISTULIPORA COMPRESSA nov. spec.

Occurs associated with the former.

It grows in compressed ramose stems about one centimeter wide in the larger diameter, which are fixed to the ground or to foreign bodies by an irregular basal expansion. Surface raised in obtuse, unequal monticules, with a cellulose macula in the centre of each. Tubes one-sixth of a millimeter wide, of irregular form, distant about a tube diameter or less, and, if the surface is not worn, surrounded by an elevated margin. Structure in conformity with all the other Fistuliporas.

FISTULIPORA PECULIARIS nov. spec.

Is a very interesting representative of stellate or floriform tube orifices in Fistulipora, with whose occurrence in the genera Chaetetes and Collopora we have already become acquainted. It grows in thin leaf-like expansions, with orifices on both sides, or in simple leaves with an epitheca below. Orifices circular, surrounded by an equally-projecting margin, distant more than their own diameter, and exhibiting from six to ten tooth like projections from their inner circumference. By grinding away the superficial portions, the tubules appear still provided with these radial dents, an evidence that they are not spinulose projections confined to the tube margins, but the ends of vertical ridges, running through the whole length of the tubules.

The surface is dotted with scarcely-elevated cellulose maculæ, which, like the narrower intertubular spaces, are finely granulose. Intertubular tissue vesiculose. Tubules rarely septate.

Locality. La Grange, Mo. (Keokuk Limestone.)

Fourth Contribution to the HERPETOLOGY of Tropical America.

BY PROF. E. D. COPE.

1. *The collection made by direction of the Governor of Yucatan, Jose Salazar Starregui, by Arthur Schott, Naturalist of the Commission, and sent to the Smithsonian Institution.*

Cinosternum s h a v i a n u m. *C. mexicanum* Le Conte, Proc. Acad. Nat. Sci. Philada., 1854, p. 180.

Chelopus a r e o l a t u s? Cope, Proc. l. c. 1865, 186. *Emys areolatus* Duméril, Arch. d. Mus., vi. 223.

A large female specimen from Belize, from Dr. Parsons, confirms the characters of that from the expedition, and appears to be distinct from the C. p u n c t u l a r i u s.

Crocodilus m o r e l e t i i A. Duméril, Arch. d. Mus, vi. 255.

Anolis n e b u l o s u s Wiegmann.

One sp. No. 714. Very near the true A. s a l l a e i Gthr.

Anolis l a e v i v e n t r i s Wiegm.

This species is allied to S c h i e d i i Wiegm. (*sericeus* Hallow.) and t r o p i d o g a s t e r Hallow. Several specimens Nos. 503, 505, 452.

Basiliscus v i t t a t u s. *Corythaeolus* Kaup.

Abundant. A second specimen of the allied B. n u c h a l i s Cope, Proc. A. N. S. Philada., 1862, 181, has been sent to the Museum Smithsonian by Robt. Kennicott, from Panama. The B. g a l e r i t u s A. Dum. is the species since described by Gray as *B.* (*Ptenosaura*) *seemanni.*

Laemanctus alticoronatus Cope, Proc. A. N. S. Philada., 1865, 192.
Two specimens.

Ctenosaura pectinata Wiegmann, Herpetologia Mexicana. *Cyclura*, Dum. and Bibr.

Numerous specimens of this large Iguana; one taken with its mouth full of the flowers of a papilionaceous tree called Sabi. The Iguanæ are known to be herbivorous, and Günther has stated that the Basilisci are likewise. I can add the Cyclura baeolopha, and many Anoles, not only the large, but the small species. The latter take also ants, as described by Gosse and Wood. The separated plates of the muzzle, with the small scales between them, place the Metopocerus cornutus Wagl. of the West Indies between this genus and the true Cycluras. The latter species was taken by Weinland in Hayti (Mus. Compar. Zoolog.) and by Fr. Klett in Navassa, southwest from Hayti. (Mus. Academy.)

Ctenosaura acanthura Wiegmann, Herp. Mexicana.
Apparently not so abundant as the last.

Cachryx defensor, sp. et. gen. nov.

Digits shortened. Body compressed. Nostril on canthus rostralis, lateral. Femoral pores, no preanals. Tail short, flat, covered with verticils of strong, erect, conic spinous scales. Head covered with small uniform scales; no interparietal. A strong gular dermal fold. No dorsal crest.

This genus is allied to Urocentrum and Hoplurus, but differs in the possession of femoral pores. It agrees in this with the depressed genus Hoplocercus Fitzinger, but in it the caudal scales, though partially spiny, are not whorled. Euphryne Bd. resembles it, but in it the scales of the whorls are not prolonged into spines, and the animal is depressed.

Head at posterior margin of orbits equal length from end of muzzle to middle of frontal region. Scales on muzzle larger than others. Loreal region concave; nostril in hinder part of a single scale. Ear large as eye, without marginal serrations. Scales of body small, slightly imbricate, homogeneous, smooth, in transverse series, and oblique longitudinal; larger on the rump, smaller on the sides: a slightly larger vertebral series. Abdominals smooth, equal dorsals; gulars a little smaller, equal on plica. A prebrachial and postauricular fold. Scales of fore limb moderate, some of those of femur and tibia much larger, spiniferous. Caudal whorls fifteen, the scales below narrowed, keeled, the carina prolonged into a flat spine. Spiniferous superior whorls seven, spines nearly erect, those of the median row smaller. With hind limb extended, the longest digit does not reach the axilla. Femoral pores six to nine. Bright olivaceous; shoulder and two bands on humerus, and the anterior part of dorsum, with interscapular region, black, the latter with two cross series of green spots, more or less distinct on the whole body in younger specimens. In older specimens, median dorsal region bright rufous.

Total length, 8 in. 6 lines. Muzzle to gular fold, 1 in. 7·5 l.; to vent, 5 in. Fore limb, 2 in. 1·5 l. Exped. Coll., No. 585.

This remarkable genus is decidedly iguaniform, but the digits are too short for an arboreal habit. Its tail is like that of the most spinous Ctenosaura, halved, and excessively abbreviated.

Sceloporus serrifer, sp. nov.

A stout species, near the S. spinosus, but differing in its fewer and larger scales, with more serrate margins, and in its coloration. It belongs therefore to the section with large lateral scales and only one row of large supraorbitals. In this species the latter are bounded by a complete series of inner and outer marginals. Scales from nape to rump, in twenty-three cross series, each with a long mucro, and two and three lesser ones on each side of it. Interparietal broader than long; frontal narrow, only transversely divided,

posterior portion very small. Internasal longer than broad, elevated, sometimes sharply keeled. Lores deeply grooved. Claws of extended hind limb nearly to ear; femoral pores 9—10. Auricular marginal scales thin, not so large as those just preceding. Median abdominal scales once, gulars twice or thrice emarginate. Tail rather short. Length from end of muzzle to vent, 4 in. 1 l.

Color above greyish or brighter green, with a complete pea-green bordered black collar, which is narrower on the gular region. Throat and sides of ♂ blue, the latter broadly black-bordered behind and medially. A yellow bar across prefontals, one between orbits and one across occiput, all separated by brown or blackish, the posterior green-bordered behind. Younger specimens have the back brown cross banded. Nos. 734, 719.

Sceloporus chrysostictus, sp. nov.

Near the S. scalaris, but without auricular marginal scales larger than the temporal, with smaller dorsal scales and different coloration. Lateral and ventral scales nearly equal; dorsals in forty-five rows from occiput to rump, obtusely mucronate, not notched. No larger plates behind parietals. Cephalic plates rugose; three pair supranasals; internasal small, flat; frontal nearly equally transversely divided, anterior half longitudinally divided. Interparietal narrowed anteriorly, long as broad; parietals oblique, longer than broad. Supraorbitals surrounded by marginals, the external separated from them by a row of rhombic scales. Unguis of extended hind limb to near nostril. From end of muzzle to vent, 2 in. 2 lines.

Brown, with two golden longitudinal lines from above ear to above groin, separated by nine rows of scales. A series of short, indistinct reddish brown cross-bars on each side the dorsum within these lines. Sides darker, with golden spangles; axilla and scapular region black. Head dark brown; below pale brown, chin darker.

Nos. 507 and 201.

Sphaerodactylus glaucus Cope, Proc. Acad. Nat. Sci, 1865, 192.

Several specimens. Dr. Berendt has also sent this species from Tabasco, with Rhinophrynus dorsalis.

Thecadactylus rapicaudus Gray. *Platydactylus Theconyx*, Dum. & Bibr.

One specimen, with several oblique, lateral, dorsal black spots.

Coleonyx elegans Gray, Duméril, Arch. d. Mus. viii. 438, Tab.

No. 483. Prof. Sumichrast has sent this species from Orizaba, (6334,) and Morelet originally procured it in Peten. Another species of the same genus is Stenodactylus variegatus Wiegm., Baird, U. S. Mex. Boundary Survey. *Brachydactylus* Peters, Monatsber. Preuss. Acad. 1863, 41, is identical.

Cnemidophorus sackii Wiegm.

This species is a true Cnemidophorus, and not an Ameiva, as formerly supposed.

Typhlops microstomus, sp. nov.

This is a slender species, stouter posteriorly than anteriorly, with small flattened rounded head, and muzzle obtuse and very prominent in profile. Labials four: first minute; second subquadrate, below preocular; third and fourth elongate vertically, and embracing between them a subocular; fourth highest, in contact with oral fissure by its anterior angle only. Ocular rather smaller than subocular; eye a small black speck on the oculo-præocular suture; præocular very large, broader than both nasals, outline almost angulate in front; two equal supraoculars larger than ocular. Nasal much narrowed above, nostril at nearly half its elevation, connected with labial suture by a long suture which is convex posteriorly, leaving postnasal narrower than prenasal; and with rostral suture by a short transverse fissure. Median cephalic series not smaller than lateral. Body scales in eighteen longitudinal rows.

Vent little visible, nearly terminal. Tail very short, straight, its acumination nearly continuous with inferior plane. Length 10 in. 7 lin.; of tail, 0·9 lin.; diameter of posterior abdomen, 1 line. Color yellowish olive, becoming brighter yellow posteriorly. Coll. Commission, No. 716.

This species is only allied to the T. disparilis Jan, Iconographie, Tab. vi. f. 6, but is more slender anteriorly, has broader preocular, more elevated nostril, much smaller ocular, higher labials, etc. etc.

Boa eques Dum. & Bibron. Cope, Proc. Acad. Nat. Sci. Phila., 1860, 243. Several specimens.

Tantilla vermiformis Cope, Proc. Acad. Nat. Sci. Phila., 1861, 74. *Lioninia vermiformis* Hallow., l. c., 1860, 484.

One specimen.

Tantilla moesta. *Homalocranium moestum* Günther, Ann. Mag. N. H. 1863, p.

Rather slender; tail five and one fourth times in total length; muzzle rounded, scarcely projecting; orbitals 1—2, the anterior higher than long, barely in contact with postnasal. Superior labials seven, last highest. eye over third and fourth. Temporals 1—2. Pregeinals longer, in contact with mental; inferior labials six, fourth largest. Vertical plate longer than broad, posterior margins longer than lateral; supercciliaries short, broad. Scales of body in fifteen rows. Total length 13½ inches.

Glossy black, chin and throat, and a collar involving postorbitals and borders and ends of occipitals and three rows of nuchal scales, yellow.

This genus now embraces the following species.

T. planiceps m., Proc. Acad. Nat. Sci. Philad., 1861, 74. *Coluber* Blainville, Nouv. Ann. Mus. Paris, 1834, 62. Baird & Girard, Serpents, 154.

T. gracilis, Baird & Girard, l. c. 132.

T. hallowellii Cope, l. c. 1861, 74.

T. vermiformis m. e. Hallowell, supra.

T. reticulata Cope, l. c. 1860, 77.

T. miniata, Cope, l. c. 1863, 100.

T. coronata Baird & Girard, l. c. 131.

T. melanocephala m. e. Schlegel, Dum. & Bibr., 859. Var., with longitudinal bands. Guadalaxara, Mexico, *Major;* Trinidad, W. I., *Gill.*

T. nigriceps Kennicott, Proc. A. N. S. Philad., 1860, 328.

T. moesta m., supra.

T. laticeps Günther, Proc. Zoolog. Soc. London, 1860, 240.

T. semicincta, Dum. & Bibr. 862.

Ficimia publia, sp. nov.

This species is intermediate between the F. olivacea and F. variegata,* and the Gyalopium canum† m., having the broad rostral of the former in contact with the frontal, and the two internasals of the latter.

Nostril little longer than broad, concave, its apex more than a right angle, recurved, the plate concave, contracted at its junction with the frontal. A suture from nostril to interlabial suture; second labial largely in contact with prefrontal; eye over third and fourth, fifth triangular, sixth largest, seventh and last smallest; seven inferior labials, postgeneials rudimental. Orbitals 1—2; temporals 1—2; occipitals rounded behind, broad as long; vertical broader than long; supercciliaries longer than broad. Scales broad, in seventeen rows, the second nearly equal first. Gastrostega 138; anal divided; urostega 37 pairs.

Light yellowish-brown above, with twenty-nine or thirty subquadrate or narrow transverse brown spots; a larger nuchal spot; sides brown punctate; head darker shaded above, a brown spot below eye. Below immaculate whitish. Total length 8 in. 9 l. Nos. 625, 726, Comission Collection.

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* Amblymetopon Günther, Catal. † Vid. Sillim. Journ., 1863.

Stenorhina ventralis Dum. & Bibr. Cope, Proc. A. N. S. Philad., 1860, 242.

Ninia collaris, Jan. Elenco, 35. Cope, Proc. A. N. S. Philad., 1863, 100.

Masticophis bilineatus m. *Herpetodryas bilineatus* Schlegel, Jan. Elenco, Syst. 81.

Two specimens. Masticophis is the first name published with description for this genus, which I characterized (Proc. Acad. 1861, 560) under the name Drymobius Fitz. It embraces all the Herpetodryades of authors, (vide Jan's Elenco,) except the H. carinatus, H. sebastus m., and H. flavescens m. (*Phyllosira* m.) No. 777.

Thrasops mexicanus Cope, Proc. A. N. S. Philad., 1861, 557. *Leptophis* D. & B. *Ahaetulla* Gthr.

Two specimens. No. 771.

Leptodira annulata var.

Much like the South American variety in characters, but slender, with very narrow neck and broad head, like Himantodes. The head is broader, and the neck more constricted than in annulata; scales narrower, in twenty-one rows; prefrontals broader than long, loreal square; one preocular little apparent on upper surface of head, two postoculars; eight upper labials; eye over fourth and fifth; third sometimes in contact. Gastrostega 184, anal divided; urostega 81.

Grey, with twenty-two jet black half rings, extending to gastrosteges, the anterior broader, posterior pointed in front. Below immaculate. A black band from eye crosses angle of mouth and unites with first nuchal half ring. Total length 18 in. 2 l.; of tail, 4 in. 4 l., which is as broad as from end of muzzle to its border.

Tropidodipsas brevifacies, sp. nov.

This species approximates nearly the form of Leptognathus in its pregenials broad as long, and postgenials broader than long, and in the lack of complete preocular. It differs from the two known species of its genus in having smooth scales. An upper preocular, on one side exceedingly minute, neither attaining the frontals; a loreal extensively margining orbit, on one side divided by a horizontal suture. Postoculars three, inferior in contact with fifth and sixth labials, superior with occipital only. Superior labials nine, three posterior longer than high; inferior eleven, fifth and sixth minute and bordered by two hexagonal shields within; (one side mutilated.) Internasals and prefrontals broader than long, frontal broad as long, lateral longer than posterior suture; temporals 2—3—4. Gastrostega 171, five single gulars, one entire anal, urostega 86 pairs. Tail $3\frac{2}{3}$ times in total length.

Glossy black, with ten on the body and seven on the tail yellow annuli, which occupy four scales and five gastrostega. A broad yellow collar reaching to the occipitals and involving two posterior labials, and four gular shields.

The teeth in this species are short and weak, and the maxillary bones slender and not alate. Coll. No. 753. One specimen.

Elaps ornatissimus Jan, Elenco.

Smilisca baudinii m. *Hyla vanvleitii* Bd. *Hyla baudinii* Dum., Bibr. viii. Apparently abundant.

Triprion petasatus Cope. *Pharyngodon petasatus* m. Proc. Acad. 1865, 193. Generic name preoccupied in Helminthes.

Bufo valliceps Wiegmann, Peters. *B. nebulifer* Girard.

Bufo marinus. *B. agua* Daudin.

Rana halecina Bosc. One sp., No. 712.

II. *A collection of Reptiles, from Belize from Dr. Parsons*, contained

Cinosternum leucostomum, Ptychemys ornata, Dermatemys mavei and Chelopus areolatus.

Of Ophidians, Leptodira annulata.

Coniophanes bipunctatus Cope, Proc. 1860, 248. *Coronella bipunctata* Günther, Catal., 36.

The other species of this genus known are—

C. fissidens Hallowell, Günther, Catalogue B. M. (*Coronella.*)

C. proterops Cope, Pr. A. N. Sci. 1860, 249.

C. punctigularis m. l. c. 1860, 248.

C. dromiciformis m. *Tachymenis dromiciformis* Peters.* Monatsber. Berlin, 1863, p. 273.

C. lateritius m. l. c. 1861, 524.

C. imperialis m. l. c. 1861, p. 74. *Tæniophis imperialis* Bd., Gird., U. S. Mex. Bound. Surv. Rept., 23, Tab. 19, fig, 1.

Coluber triaspis sp. nov.

Form compressed, as in C. laetus; scales all small, smooth, faintly carinate on the caudal region, in thirty-three longitudinal rows; head elongate, with three or two loreals, one preocular and two or three postoculars. Maxillary teeth weak, slightly longer in front. Vertex and front plane, muzzle narrow, rounded, rostral not prominent. Nasals elongate, internasals a little broader than long, prefrontals long as broad. Preocular not quite reaching frontal; latter longer than broad, front and sides straight, forming rectangles, posterior angle very open. Temporals three, long, oblique *upwards and backwards* from the sixth upper labial, separated from occipital by two small scales. Nine superior labials, *all* longer than high, fourth and fifth under orbit. Pregenecials long, postgenecials rudimental. Tail a little less than one-fifth total length. Gastrostega 266; anal divided; urostega 118.

Yellowish gray, with fifty jet black, white margined dorsal spots, which occupy thirteen scales transversely and three and four longitudinally. They are narrower and more approximated posteriorly, and are accompanied by a series of similar quadrate lateral spots alternating with them: light brown irregular spots on the ends of the gastrostega. Below immaculate. A narrow and broad black crossband on the muzzle, latter from orbits; one on each side from the superciliary shield to the nape, and a median band from middle of frontal to beyond occipitals, enclosing a pale occipital spot.

This species is said to be common in the Belize, "where it is called Clap and Sawyer." It grows to eight or nine feet in length, and is very active in its movements.

This is an anomalous species of the genus; its elongate form, loreals, and general physiognomy approximate it to the Dipsadine genus Trimorphodon, of the same region.

Masticophis margaritiferus. *Drymobius* m.

Elaps ornatissimus Jan, Elenco.

Elaps diastema Dum., Bibr.

Bufo sternosignatus Günther, Catal.

The same correspondent sends from the neighboring region of Honduras—

Ninia collaris m. *Streptophorus sebæ collaris* Jan, and

Rhegnops† visoninus gen. et sp. nov.

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* Professor Peters finds Coniophanes Hallowell probably identical with Tachymenis Wiegmann. The distinctions are well marked,—in the former one preocular and no scale pores, in the latter two preoculars and one scale pore. The former genus has been since called Glaphrophis by Jan, and the Tachymenis hypoconia m. l. c. 1860 249, is *Mesotes obtrusus* Jan, Coronellinæ, 1863.

† Ῥίγνυμι from the severance of the nasals.

The genus is near to Carphophis in most respects, including the divided anal shield, but differs in its two distinct nasals, of which the anterior is pierced for the nostril. There are two postoculars, and fifteen series of scales. Teeth equal. Form rather slender. The postgenеials are quite small, and converted into scales similar to those at the extremities of the gular gastrosteges: they nevertheless occupy the true position of geneials. The pregeneials are very large, and so wide as to reduce the two small inferior labials bordering them anteriorly, to a longitudinal linear form; they crowd the first pair into a transverse linear series: the symphyseal is very small and transverse. Seven inferior labials, fourth and fifth much largest. Superior labials seven, of which the last and fifth are large, the lattter not quite reaching superior postocular, the sixth lower: temporals 1—1. Occipitals elongate, frontal broader than long, prefrontals several times as long as internasals, largely margining orbits. Rostral not projecting; nasals two, nostril in anterior, which nearly reaches labial border; loreal long, bounded by second, and chiefly third superior labial. Pupil round. Gastrosteges 135, anal divided, urosteges 36. Length of head and body, 10 in.; of tail, 2 in. 2 l.

Color above glossy dark brown, the centres of the scales paler, of the outer row especially, reducing the dark to mere margins. A darker brown line from nape to tail on the fifth series on each side. A darker shade on hinder part of occipitals and end of muzzle. Straw-colored below, extending on superior labials round margin of rostral: tail brown below, except middles of proximal scutella.

In this species the pupil is round.

Siphonops syntremus sp. nov.

This species differs from the four hitherto known, in the close approximation of the narial and tentacular openings: the latter lie a little behind the former, and are slightly larger. The minute eyes are just visible; the internal nares are some distance behind the palatine arch. Muzzle projecting, obtuse in profile; from above narrowed, rounded. Teeth large, five on each ramus mandibuli. A gular, and strong postgular fold; 130 annular plicæ, which are complete, except slight ventral interruption anteriorly; the posterior third of the length with intermediate annuli, which are first lateral only, then complete above, entirely complete on the terminal inch: the whole number will then be about 170 annuli.

Form of body rather slender; tail depressed at end, short, acuminate.

Color dark plumbeous, annuli yellow lined; head yellowish brown.

This species resembles the Cœcilia ochrocephala, but is primarily distinguished by the position of the foramen, and of the inner nares, also by the color and character of annuli.

The species of the genus now are, S. indistinctus, R. & L., S. annulatus Mikan, S. brasiliensis Lütk., S. mexicanus Dum., Bibr., and S. syntremus m.

III. *Notes on Neotropical Batrachians.*

Ranula chrysoprasina sp. nov.

In examining a collection sent to the Smithsonian Institution from Arriba, Costa Rica, from Chas. N. Riotte, I was much surprised to notice what was apparently a Hylorana near H. erythræa. Doubting the correctness of the locality, I laid it away. Having since seen other and allied species from Tropical America, I recognize the existence of a genus representing Hylorana, but differing in the important particular of the incompleteness of the ethmoid arch, its superior plate being represented by cartilage. In the present species the terminal phalanges are slender, and furnished with a transverse limb, though the dilatations are small; the latter are distinct in the Rana coeruleopunctata Steindachner; in an undescribed species from Vera Paz the the transverse limb is very small, but present.

The generic characters will then be—

Ethmoid arch superiorly cartilaginous; prefrontals narrow, longitudinal widely, separated. Distal phalanges slender, with transverse limb; no metatarsal shovel; tongue bifurcate.

Ranula affinis. *Rana affinis* and *Ranula gælmerii* (young) Peters, Monatsber, Berlin. Venezuela.

Though I employ the name given to this species for the genus, I am not positive as to the condition of the distal phalanges.

Ranula sp. nov. O. Salvin; Vera Paz, Venezuela.

Ranula coeruleopunctata. *Rana* do. Steind., Verhandl. Bot. Zool. Gesselsch. Wien, 1864, 264. ? South America.

Ranula chrysoprasina.

The species is allied to the last, but has a relatively shorter muzzle and limbs. Nostril nearer end of muzzle than orbit (equidistant in coeruleopunctata); muzzle 1 1-5th orbit (1 2-5th Steind.) Under jaw anteriorly abruptly truncate. Canthus rostralis straight, strong, muzzle acuminate from its extremity, projecting; loreal region vertical. Tympanum elliptic two-thirds orbit. Vomerine teeth weak, in convergent fasciculi behind opposite nares. Skin shagreened above, a glandular fold on each side. The longest finger cannot be extended to vent; heel to middle loreal region. Toes fully not widely palmate, three distal phalanges of fourth free; one minute metatarsal tubercle.

Color brilliant leek green, the groin and belly approaching golden: a golden band from lip to shoulder, and faint one on each side back. Limbs above, and tarsus and forearm below, black, the femur with a few golden spots on black ground behind. Head dark above, from eye to shoulder black; below pale yellowish green immaculate, except some dark shades on sternal regions.

Length of head and body 1 in. 9 l.; of fore limb 1 in.; of hind limb 2 in. 7·5 l. Costa Rica.

Steindachner represents much less palmation than exists in our specimen.

It is interesting to observe how that this Raniform type, while preserving its definitive features in this outlying region of its distribution, and within the limits of the lower faunæ of South America and Australia, offers the lowest condition of cranial structure consistent with this type, *i. e.*, the imperfection of its ethmoid and prefrontal bones.

Colostethus latinasus gen. nov.

By this name I propose to characterize a genus of Ranidæ, the type of which is the *Phyllobates latinasus* m., Proc. Acad. Nat. Sci. 1863, 48.

The sternum is Raniform without manubrium, and with membranous xiphisternum, quite as in the Bufoniform genus Dendrobates, from which the presence of very well developed teeth only separates it. It will form a Group I. of Fam., Ranidæ before that occupying that place in System Batrachia Salientia, Nat. History Review, 1865, and tending towards Bufoniformia. The characters are—

Group I. No manubrium, xiphisternum membranous. External metatarsi bound; distal phalanges with terminal transverse limb.

Character of genus. Digits free with dilatations; no vomerine teeth; prefrontals widely separated by the largely produced bony superior ethmoid plate.

Bufo coccifer sp. nov.

Parotoids round semiglobular. Muzzle narrowly rounded, nearly as long as orbit. Strong bony, canthal, pre-, sub-, and postorbital, supratympanic and supraorbital ridges; the last regularly curved and sending parietal branch towards the median line; the first rapidly converging, leaving only a gutter between. Tympanum one-fifth orbit. Everywhere minutely tubercular,

those of the sides and forearm conic: soles rough, web short, metatarsal tubercles small, obtusely prominent; tarsal fold scarcely visible. Heel to axilla. Two obtuse metacarpal warts.

Gray brown; a yellow vertebral line, with numerous chestnut brown light bordered spots on each side. Sides with two longitudinal brown bands, one from parotoid and one from groin. Limbs irregularly light varied above. Under surfaces immaculate.

Length of head and body 2 in. 6 l.; breadth at angle of jaws below 1 in. Length of fore limb 1 in. 5 l.; length of foot 1 in. 3 l.

Arriba, Costa Rica, C. N. Riotte. Smithsonian, No. 6490.

This handsome species resembles the B. ocellatus Gthr. in coloration.

Phyllobates rideus sp. nov.

The close areolation of the abdomen, throat, and lower face of femora, the recurved angle of the mouth, the minute (one-eighth orbit) tympanum above the ordinary position, and truncate tongue, are marked features in this species. The tongue is broad and extensively free, and each angle behind is thickened. Choanæ small, Eustachian ostia minute. Skin smooth, without folds or tubercles, except a few wartlets over orbit. The eyes are large and prominent, diameter of *orbit* nearly equal from same to end of muzzle. Latter projecting beyond jaw, nares behind the tip, each on an angle of canthus approximated. Canthus strong, a little concave; loreal region oblique. Greatest width of head (behind) equal to length of same, and entering $2\frac{2}{3}$ in total. Heel and palm to end muzzle. Fingers and toes long, free, dilatations well marked.

Color above grayish brick-red, with a gray cross bar between eyes, two across tibia and three across femur. Sides with some gray shades, lip with five bars of the same, two from the orbit. A black spot on tympanum, and gray line on canthus. Below, and inner faces of limbs pale brownish.

Habitat.—St. Juan River, Nicaragua, Robt. Kennicott; Mus. Smithsonian.

Engystoma variolosum sp. nov.

Two strong compressed metatarsal tubercles, a sublongitudinal cuneiform and subtransverse opposite it: toes slightly webbed. Width between tympanic regions nearly double the length from muzzle to nuchal fold. Muzzle prominent, as long as orbit, nostrils nearly terminal. Mandible with two symphyseal notches, and median knob. Tongue flat, elongate; slits of vocal vesicle large. Heel to front of scapula.

Dark brown above; under side limbs and belly darker, with numerous large yellowish spots. Sides anteriorly blackish brown, which has a serrate margin above. Femora, forearms and tarsi same behind, with coarse yellow vermiculations: some yellow spots behind the angle of the mouth. Length of head and body 1 in. 4·5 l.; of posterior limbs 1 in. 7 l.

This species resembles the East Indian species called Diplopelma by Günther, on account of the palmate feet: if this is the only ground of distinction, the genus must be united with Engystoma.

Arriba, Costa Rica; Chas. N. Riotte. Mus. Smithsonian, No. 6486.

Engystoma ustum.

This animal agrees with the preceding in its two metatarsal tubercles, but they are less acute, the exterior being only an acuminate wart. Toes entirely free. Muzzle more prominent than in the last or E. carolinense, little longer than orbit; head larger relatively than in the last mentioned species, with which it agrees in size. Width of cranium at tympanic region less than $1\frac{1}{2}$ times from muzzle to nuchal fold.

Length of head and body 11 lin.; posterior limb 12 lines.

Deep brown above, yellowish brown below, with numerous approximated pale spots, which extend slightly on sides. Limbs unicolor.

Habitat.—Guadalaxara, West Mexico. I. I. Major.

The E. carolinense never exhibits more than one metatarsal tubercle.

A species of Coecilia occurs in Panama, of which a specimen was sent to the Mus. Academy by Drs. Gallaer and John L. Leconte, viz.:

Cœcilia ochrocephala.

Proportions near those of Siphonops mexicanus; length fifty-one times the diameter at middle. Tail obtuse depressed. Head narrowed, muzzle decurved, not truncate, projecting acutely (in profile) beyond mouth. Tentacular foramen a little below, nostril more above the angle of the muzzle; eyes not visible. Posterior nares close behind palatine arch. Annuli, commencing at head, 200, equidistant, complete above and below. On the terminal inch there are intermediate plicæ, on the dorsal surface only, except on the last three lines, where they are complete. Total length 12 in. 9 l.

Yellowish plumbeous. The plicæ dark; throat and head ochre yellow.

Fine examples of the C. compressicauda D. & B., and Siphonops indistinctus Lütk. are in the Mus. Essex Inst., Salem, Mass., the last from the Rio Grande, Brazil.

IV. *On Reptiles from Orizaba, Vera Cruz.*

There remain to be added to the Catalogue of Reptiles sent by Professor Sumichrast from Orizaba, published in Proc. Academy 1865, 195,—

Spelerpes lineolus m. Proc. Acad. 1865, 197.

Spelerpes oreulus ib. maintains its character of stout body and head, and dark colors, but not the absence of angulation of the lip, as this is strongly marked: the dorsal region and tail above are dark red, offering a general resemblance to Plethodon erythronotus. (No. 14.)

Bufo cristatus Wiegmann, Isis, 1863, 660. Peters, Monatsb. Berlin, 1863, 82. Brought also from near Vera Cruz by Dr. Sartorius.

Lithodytes (Craugastor) griseus m. *Hyla grisea* Hallow.

Cystignathus melanonotus Hallow. var.

Coleonyx elegans supra.

Barissia antauges sp. nov.

A species differing from those already known in the entire smoothness of the scales of the body, while those of the tail are arranged in obtuse and strong ridges. Nuchal rows eight, those of body $\frac{16}{12}$. A depression along the vertebral line; six scales margin the vent. Labials $\frac{10}{8}$, three last superior nearly equal, separated by four rows of nearly equal temporals from parietals. Latter broad as long, well separated, with the fronto-parietals by the elongate interparietal. Five supraorbitals, embracing three superciliaries. Prefrontals longer than broad; three pairs supranasals. Tail short for the genus. Limbs also short. Head short and elevated. End muzzle to axilla 1 in. 3 l.; latter to vent 2 in. 1 l.; from latter to end tail 4 in. 1 l.

Above dark brown, with a subdivided iridescence as though greased, and with many small blackish brown spots, which are more distinct on the tail. Sides with about seventeen irregular vertical black bars from opposite nape to groin, each bordered with yellow specks behind. Front of ear and lips black, yellow varied; body and tail below, blackish, with very many yellowish-white specks.

No. 11, Sumichrast's Coll. Stated by Prof. S. to be very rare.

Ficimia olivacea Gray.

Description of five New Species of the Genus UNIO.

BY ISAAC LEA.

UNIO SIAMENSIS.—Testa lævi, transversa, subcylindracea, ad basim emarginata, valde inæquilaterali, subcompressa, ad latere planulata, postice truncata, antice rotundata; valvulis tenuissimis, diaphinis; natibus prominulis; epidermide luteo-oliva; dentibus cardinalibus acicularis, sublongis, obliquis; lateralibus longis, lamellatis subrectisque; margarita alba et iridescente.
Hab.—Siam; C. M. Wheatley.

UNIO ASPERULUS.—Testa plicata, elliptica, inæquilaterali, postice subbiangulata, antice rotundata; valvulis subtenuibus; natibus subprominentibus, ad apices undulatis; epidermide viridi-oliva, obsolete radiata; dentibus cardinalibus lamellatis, parum obliquis, in dextro duplicibus; lateralibus sublongis, lamellatis subcurvisque; margarita cærulea et valde iridescente.
Hab.—Siam; Thomas R. Ingalls, M. D.

UNIO PILATUS.—Testa lævi, elliptica, valde inæquilaterali, postice obtuse angulata, antice rotundata; valvulis crassiusculis, antice crassioribus; natibus subprominentibus, ad apices minute undulatis; epidermide luteo viridi, micanti, obsolete radiata; dentibus cardinalibus duplicibus; lateralibus sublongis, subrectis lamellatisque; margarita alba et valde iridescente.
Hab.—Siam; Thomas R. Ingalls, M. D.

UNIO EVITATUS.—Testa lævi, elliptica, valde inæquilaterali, postice subbiangulata, antice rotundata; valvulis subtenuibus, antice parum crassioribus; natibus prominulis, ad apices divaricate undulatis; epidermide olivacea, obsolete radiata; dentibus cardinalibus parviusculis, compressis, in utroque valvulo duplicibus; lateralibus sublongis, subrectis lamellatisque; margarita alba et iridescente.
Hab.—Bengal; W. A. Haines.

UNIO STREBELII.—Testa lævi, oblonga, ad latere compressa, inæquilaterali, postice obtuse angulata; antice rotundata; valvulis subcrassis, antice aliquanto crassioribus; natibus prominulis; epidermide luteo-fusca, radiata; dentibus cardinalibus subcrassis, elevatis, crenulatis, in utroque valvulo duplicibus; lateralibus sublongis, subcrassis, subcurvatus corrugatisque; margarita vel purpurea vel salmonea et valde iridescente.
Hab.—Vera Cruz, Mexico; G. Strebel.

Description of two New Species of the Genus LITHASIA.

BY ISAAC LEA.

LITHASIA CYLINDRICA.—Testa striata, cylindracea, flavescente, vittata vel evitata; spira subelevata; suturis irregulariter impressis; anfractibus constrictis, ultimo grandi; apertura subconstricta, rhomboidea; labro acuto, sinuoso; columella alba et valde sinuosa.
Hab.—Coosa river; E. R. Showalter, M. D.

LITHASIA WHEATLEYI.*—Testa lævi, subcylindracea, luteo-virente, vittata; spira elevata; suturis irregulariter impressis, anfractibus planulatis, ultimo subgrandi; apertura subconstricta, rhomboidea, intus vittata; labro acuto, sinuoso; columella alba et valde iridescente.
Hab.—Cahaba river, Alabama, E. R Showalter, M. D..

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* Named after Mr. C. M. Wheatley, to whom I am indebted for the possession of a specimen

Critical Review of the Family PROCELLARIIDÆ:—Part IV; Embracing the ÆSTRELATEÆ and the PRIONEÆ.

BY DR. ELLIOTT COUES, U. S. A.

In the present paper, the fourth of the series, are together considered the *Æstrelateæ* and the *Prioneæ*, mainly for the purpose of showing how closely related these sections are through certain of their genera.

For the first of these sections three names are at our disposal; sc. *Æstrelateæ*, *Daptioneæ* and *Rhantisteæ*. Of these I prefer to accept the first, both as having priority, and being taken from the name of the typical and largest genus of the group; the second being based upon a subtypical genus with but a single species, and the third being derived from Bonaparte's erroneous identification of Kaup's Fulmarine genus *Rhantistes*.

The section *Æstrelateæ*, as here restricted, corresponds very nearly with the group defined under this name in Bonaparte's Conspectus. There is here, however, included in it the genus *Daption**, by Bonaparte placed among the *Fulmareæ*; and it is considered as probably connecting the *Æstrelateæ* with the Prions. The genus *Thalassoica* is excluded as being essentially Fulmarine. In generic arrangement I am compelled to differ widely from the distinguished author just named. After attentive and critical examination of his genera *Cookilaria*, *Pterodroma* and *Bulweria*, I must confess my inability to distinguish either of them from *Æstrelata* by a degree of morphological difference which, by any sublimation of characterization, can be considered of generic import. "Bulweria" has a rather more elongated and decidedly cunëiform tail than have the majority of the Æstrelatas: but differs from some of them in this respect, no more than they do among themselves. "Pterodroma" comprises some fuliginous species morphologically identical with *Æstrelata*. "Cookilaria" has no characters whatever assigned to it by its author; possibly because none are to be found in the species included under it.

I do not hesitate to follow natural data afforded by specimens, even should they conflict with the opinions of so justly distinguished an author as that of the "Conspectus;" especially since the more closely I scrutinize his work upon the Petrels, the more irresistibly the conviction is forced upon me, that it is, to speak in the mildest terms, unreliable. It cannot be denied by the most strenuous of his advocates, that there are to be found in this work instances of unnecessary if not unwarrantable pseudo-generic subdivisions; of some pure figments in the way of species; of rash collocation of synonymy; and of weak and intangible diagnoses. These are to the last degree discouraging, because perplexing, to the student.—*credo mihi experto*. They would, however, be less repellant, and bear much more weight, could we feel satisfied that they represented the matured opinions of the author, based upon well-digested facts. Such unhappily is not the case; for the views expressed on different occasions are found to fluctuate according to the particular theory which may have been in posse sion of his mind at the time of writing; and are often diametrically epposed to each other. That I may not seem to wantonly criticise one of the most brilliant lights that has ever shed its radiance upon Ornithology, to whom alas! it was not permitted to finish his last great work, I may be allowed to sustain myself by a simple comparison of the "Conspectus" with the Table of the Longipennines published in the Comptes Rendus. The fasciculi of the former which treat of the Petrels bear date of Dec., 1855, and Jan., 1856; the latter is of the séance of April 28, 1856. I only cite some of the more glaring discrepancies of generic arrangement and distribution of species; for concerning synonyma it may be stated that as a general rule conflicting views are entertained on all debatable points.

* The true relationship of this genus is still with me a matter of some uncertainty.

C. A. Genus *Majaqueus* placed among the *Puffineæ*; *Pterodroma* and *Pagodroma* among the *Æstrelateæ*.—C. R. These three genera placed among the *Fulmareæ*.

C. A. *Priocella Garnotii*, H. and J. (= *Thalassoica glacialoides* according to Gray) not recognized.—C. R. Given as a valid genus and species of *Fulmareæ*.

C. A. *Proc. meridionalis* Lawr. considered as a synonym of *Æstrelata diabolica*.—C. R. Given as a valid species of genus *Fulmarus*.

C. A. Genus *Adamastor* founded and considered as a component of the *Fulmareæ*, with *typus* Bp. (=*cinerea* Gm.) *sericeus* Less. and *flavirostris* Gould, as its species.—C. R. Genus *Adamastor* abandoned, and its three species *distributed* thus:—*typus* (here called *cinerea* Gm.) is put under *Priofinus*,* among the Puffins; *flavirostris* and *sericeus* (the latter queried as to validity) are put under *Æstrelata* of the "*Rhantisteæ*."

C. A. Genus *Cookilaria* established with *leucoptera* Gould, *velox* Soland., *solandri* Gould, and *mollis* Gould, as its species.—C. R. *Cookilaria* abandoned, *Rhantistes* ex Kaup† taken, with *Cookii* Gray, *velox* Sol. *mollis*, "unicolor," "raolensis" Gould, and *Lessoni* Garnot as determined species; *rostrata*, *parvirostris* Peale, *gelida* Gm. and *sandaliata* Sol. as doubtful species.

C. A. Genus *Æstrelata* contains *diabolica* L'Herm. (syn. *hæsitata* Temm. Kuhl,) *desolata* Gm. *inexpectata* Forst. (=*mollis* Gould) and *leucocephala* Forst. (=*Lessoni* Garnot.)—C. R. The same genus is made to contain *diabolica* L'Herm. *hæsitata* Temm. (here considered distinct from *diabolica*,) *sericea* Less. *flavirostris* Gould, *desolata* Lath.; with *gularis* and *brevipes* Peale, and *inexpectata* Forst. as doubtful species.

C. A. Genus *Nectris* Bp. emend. ex Forst. contains *brevicauda* Brandt, *carneipes* Gould, *fuliginosus* Strickl. *gama* Bp. and *tenuirostris* Temm.—C. R. *Nectris* abandoned, and its species thus distributed: *brevicauda* and *carneipes* are put with *cinereus* Gm. under *Priofinus* H. & J.; *fuliginosa* Strickl. is made a queried synonym of *Puffinus major* Faber; *gama* Bp. does not appear; while *tenuirostris* is united with *sphenurus*, etc., under the genus *Thiellus*.

However great the changes and innovations thus introduced,—which are indeed "une foule des faits nouveaux relatifs á la classification, á la nomenclature, á la synonymie, et aux divers rapports des espèces," resulting "de leur étude approfondie"‡ between Dec. 1855 and April 1856, I am unwilling to believe that the "Table" is drawn up with reference to the size and shape of the Comptes Rendus page, rather than in accordance with truth.

The numerous difficulties which beset us in the critical investigation of any group of the Petrels, reach their maximum in the section now under consideration. This is in a measure due to the habitat of most of the species—the genera being essentially South Pacific and Antarctic in their distribution—which renders the acquisition of specimens difficult, at least in such numbers as to enable extended comparisons to be instituted, and the great changes of plumage which a majority of the species undergo with increasing age, to be fully and accurately elucidated. Some are to this day known only by type specimens; while of many others we are no more familiar regarding variable features of coloration, than to enable us to speak in the most general terms of the changes undergone during progress towards maturity. But these are among the minor evils to be contended with; for Nature herself is perhaps never so difficult of comprehension, as we often find our attempts to understand her to be. And so the confounding of distinct species under one name and description; the making of nominal ones out of changes of plumage and variations in size; together with the misinterpretation by writers of the labors

* This is an important correction. "*Priofinus cinereus*" is the proper name of the species called in the C. A. "*Adamastor typus*."

† This name of Kaup's is a synonym of *Fulmarus* Leach.

‡ Bp. C. R. April 28, 1856, p. 767.

of their predecessors, have produced a bibliography so *embrouillée* as to defy our most patient efforts to completely unravel the entangled skein, and to cause us to turn with weariness if not disgust from the hopeless task. The necessity which exists for the *study*—I use the word advisedly—of synonyma, is the opprobrium of ornithology; and the kind of labor demanded for their elucidation is far removed from the real pursuit of science itself. At the same time, while an inevitable, it is too often a thankless labor, and one hardly appreciated; the results of which are usually incommensurate with the time and trouble expended. Collocation of synonyma is by no means mere clerical compilation. It is a species of investigation which, to be productive of any value, demands a sound judgment and powers of discrimination perhaps of as high a grade as those required for the successful study of genera and species. But it does not often bring to its author such rewards as are willingly granted him who elucidates other classes of facts in Natural History. For as it's chief duty is to deal with disputed points, it enters an arena where more conspicuously figure not facts but rather opinions; concerning which the right of arbitration is yielded by no man to another, The synonymist must ordinarily expect acquiescence with his views from those only whose ideas are not jostled by the opinions he advances.

It is impossible to pursue a critical investigation of the *Procellariidæ* without being impressed by these facts; which must be my only weapon wherewith to turn the edge of criticism from my efforts towards the elucidation of the family. No one can be more painfully aware of the errors of omission and doubtless also of commission, which must be met with in these papers; and none can be less tenacious of debatable views, or more ready to relinquish opinions when proof of their fallacy is made apparent. I only ask a thorough examination before a condemnatory fiat is passed upon any of the views entertained which may be at variance with current opinions.

As a rule I have adopted for species no name to which any doubt as to identity attaches; while those still open to discussion I have endeavored to treat of solely with reference to their intrinsic merits, no extraneous claims to our consideration being acknowledged. I regret the necessity of frequent citations of manuscript names and unpublished drawings, which we are by no means bound to recognize; but which have become so interwoven with the bibliography of the family, that it is impossible to avoid so doing.

The present paper, like others of mine, is doubtless amenable to the charge of "discursiveness." This fault, if it be one, is certainly of that class which "lean to virtue's side;" and one which at present I feel indisposed to correct. Words are cheap enough; and had they not been so parsimoniously doled out in the earlier days of ornithology, there would now be less need of a profuse expenditure of them.

The *Æstrelatæ*, as I regard them, are composed of three genera, which may be briefly diagnosticated as follows:—

A. Tail much graduated, or cuneiform.
   I. Bill robust, compressed, the unguis large, and curved from the nostrils. Extension of feathers on forehead normal. Hallux small. Nostrils short..... *Æstrelata.*

B. Tail slightly rounded.
   II. Bill stout, compressed, unguis large, nostrils short. Forehead low, flat, the feathers encroaching far on the bill. Interramal space feathered. Hallux large and stout..... *Pagodroma.*
   III. Bill greatly dilated. Nostrils long. Feathers on forehead normal in extension. Unguis small and weak. Interramal space partially naked. Hallux ordinary... *Daption.*

Color also affords us an excellent artificial index to these genera. Thus *Æstrelata* is bicolor or fuliginous; *Pagodroma* is unicolor, white; and *Daption* is spotted with light and dark colors.

[May,

The first of these genera, after the fusion with it of those of Bonaparte already adverted to, is quite an extensive one, comprising more species than any other of the family. In this paper I enumerate eighteen, which appear to have just claim to recognition. At the same time some of them, as I intimate, may not be valid, while I am quite willing to believe that there may exist good species of which no cognizance is here taken.

ÆSTRELATA Coues, [emend. ex Bp.]

Procellaria sp. Auctorum.
Daption sp. Stephens, Shaw's Gen. Zool. xiii. 1825.
Puffinus sp. Webb and Berthelot, Av. Canar. 1836—44.
Ossifraga sp. et *Thalassoica* sp. Reichenbach, Syst. Av.
Æstrelata, Bonap. C. A. 1855, ii. p. 188. Type *Proc. hæsitata*, Temm.
Cookilaria, Bonap. C. A. 1855, ii. p. 190. Type *Proc. Cookii*, Gray.
Pterodroma, Bonap. C. A. 1855, ii. p. 191. Type *Proc. macroptera*, Smith.
Bulweria, "Bp. 1836." (Gray.) Bp. C. A. 1856, ii. p. 194. Type *Puff. columbinus*, Webb and Berthelot.
Rhantistes, Bonap. Compt. Rend., April, 1856, xiii. p. 768. Type *Proc. Cookii* Gray. (Not of Kaup, 1829, the type of which latter is *Proc. glacialis*, Linn.)

Chs.—Bill about as long as the tarsus; very stout; compressed; higher than broad throughout; lateral outlines nearly straight, converging to the much compressed unguis. Unguis particularly large, strong, its upper outline very convex, its tip greatly decurved; arising almost immediately from the end of the nasal tubes, leaving but a very brief and quite concave culmen proper. Lateral element of the bill very strong; rising high up at the root of the nasal case; somewhat inflated throughout; and with a strongly convex inferior border; which with the great decurvature of the unguis produces an extremely sinuate commissure; outline of lower mandible nearly straight; of gonys a little concave; eminentia symphysis well marked. Sulci on both upper and under mandibles distinct. Nasal tubes of moderate length, elevated, conspicuous, not carinated, dorsal outline about straight, apex more or less vertically truncated, orifice subcircular, each naris oval, separated from its fellow by a thin vertical portion which comes well forward. Interramal space narrow, fully feathered. Wings comparatively longer than in most sections, surpassing the tail when folded; pointed; but the second primary nearly as long as the first. Tail long, and much graduated; sometimes almost cuneate, usually much rounded; the rectrices quite broad to their tips. Feet of moderate size; tarsus moderately compressed, with the ordinary small subhexagonal reticulations; about as long as or a little less than the middle toe without its claw. Outer toe rather surpassing the middle; with its claw about equalling the middle and claw. Tip of inner claw reaching base of middle one. Hallux short, sessile, conical, acute, elevated. Of moderate and rather small size; bicolor, or nearly so; in youth nearly unicolor.

The genus *Æstrelata* as thus defined is quite an extensive one, comprising a larger number of species than any other of the family. In its geographical distribution, it is essentially southern and antarctic; only a very few of the eighteen or more known to compose it being found in north temperate latitudes. The numerous species all agree in certain points which separate them from others; the principal of which is the large size and great convexity of the unguis of the bill: which begins to rise almost immediately from the nasal case. Other peculiarities will be noted in the above diagnosis; which have caused the species to be put in intimate relation to each other when collocated even by those writers who recognize but one, or at most three or four genera of *Procellariinæ*.

Taking the *hæsitata* as the type of the genus, we find that most of the species,—*Lessoni*, *rostrata*, etc. agree entirely with it: while some others, e. g. *Cookii*, differ in being smaller and more slenderly built, with rather less

robust bills, somewhat longer and more pointed wings, etc. These latter characters have been made typical of a distinct genus by Bonaparte. The gradation, however, in these and all other features is so gradual, through several intermediate forms, that I do not see how we are to draw the dividing line. Bonaparte moreover includes in *Cookilaria* such a species as *Solandri*, which is particularly a robust bird.

Throwing out of consideration the fuliginous "Pterodromine" group, we find that the other species of *Æstrelata* adhere quite closely to a particular pattern of coloration. When adult they are dark colored above, being of some shade of brown or black, with more or less of an admixture of cinereous, and generally have a white forehead. The color of the upper parts extends on the sides of the breast; otherwise the under parts are wholly white. When young, the color of the under parts does not differ very notably as a general rule from that of the upper: the white being obscured by a dusky, fuliginous or cinereous clouding of the tips of all the feathers, the basal portions of which remain white. In general the younger the bird the more uniform, or more tending towards fuliginous are its colors: while in adult life light and dark colors occupy distinct areas, and are quite trenchantly defined.

When we consider, therefore, the great change which the plumage undergoes in the bird's progress towards maturity, together with the similarity that exists between corresponding ages, it will not appear surprising that not only very numerous nominal species should have arisen, but that names of species should have been frequently misapplied to others than those to which they rightly belong; producing a confusion in the synonymy certainly not surpassed, if indeed equalled, in any other genus in ornithology. A number of the species were first brought into notice by voyagers; and when named by professed naturalists it was at a time when the neces ity of detailed descriptions was not appreciated, so that the nice points of size and proportion which really distinguish the species more than color, were rarely presented. The consequence is that it is now impossible to identify many of the older names with any degree of certainty, except perhaps by incidental or collateral testimony; and to this day a great many identifications remain matters of opinion rather than of fact.

Nor is the confusion and uncertainty by any means less in the fuliginous group which goes to compose this genus. Its components, so far as we know, are in every age unicolor; and are absolutely indistinguishable except by form and dimensions. This alone would have been amply sufficient for the production of synomyms and malidentifications innumerable; but this inevitable result is furthered by another fact. The "genus" *Pterodroma* is among the *Æstrelatæ* exactly what *Nectris* is among the *Puffinæ;* i. e. composed of species differing in no wise in form from *Æstrelata* or *Puffinus*, and which are entirely fuliginous in color. Now the points of form separating the species of "*Pterodroma*" from "*Nectris*" are by no means patent on a casual examination; and hence, among the older writers we find many descriptions which it is impossible to refer with any degree of certainty to one or the other genus, of which, in short, we can say no more than that a fuliginous petrel formed the subject of the article. Consequently, some synonyms have ever been oscillating as to weight of authority between these two groups.

I confess to a feeling of surprise, when, on examining critically species typical of Bonaparte's genus *Pterodroma*, I could find absolutely no points of form whereby it might be held separable from *Æstrela'a*. I do not think that the skeleton will be found to present any tangible morphological characters, critically examined in its minutest details of intermaxillary bone or phalanges; nor do the remiges or rectrices in their relative developments offer the slightest discrepancies. We must have recourse therefore to color alone if we would separate them; and Bonaparte himself gives us no other character

[May,

whereby we may recognize his genus. I am therefore constrained to unite the so called genus with *Æstrelata*.*

This fuliginous section, then, of *Æstrelata*, comprehends some four or five species, very widely distributed, as regards latitude; though, so far as we now know, chiefly occurring in the tropical and temperate portions of the Atlantic. A new species from Jamaica is being published as I write.†

With the exception perhaps of *A. Bulweri*, these are only distinguishable by size and some points of coloration of the feet.

This latter species differs from the type of "Pterodroma" in the somewhat more elongated and decidedly cuneiform tail, which is hardly contained twice in the wing from the carpal joint; and perhaps in having comparatively slightly smaller feet. The difference in the tail is no greater than that existing among unquestioned species of *Æstrelata*; and in all other points there is an absolute identity of form. This species is the type of Bonaparte's genus *Bulweria*, and by him it is placed among the Thalassidromines; upon what grounds I am at a loss to conjecture.‡ The "genus" seems to me to bear exactly the same relation to *Pterodroma* that *Thiellus*, Gloger, (as defined by Bonaparte to include *sphenurus* Gould, and *chlororhynchus* Lesson), does to *Nectris*.

The genus *Cookilaria*, founded by Bonaparte upon the *Pr. Cookii*, Gray, has not even an apology for characters whereon to base claims to recognition. A diagnosis is not attempted by its author; and a few weeks subsequently the name is dropped; § and *Rhantistes*‖ substituted, although the species collocated under the latter designation are by no means the same as those previously included in *Cookilaria*.

The other partial synonyms quoted at the head of this article are merely instances of the reference to them of some of the species included in the genus as it is here defined and limited. Of the several names at our disposal, *Æstrelata* has, so far as I can ascertain, the priority. The species given in the following pages include all I have been able to learn of, through specimens or books, as having just claims to recognition. Very possibly some valid ones are omitted; and perhaps some now retained may hereafter help to swell the list of synonyms; that wearisome and vexatious, but inevitable, mass of rubbish, repelling inquiry, and retarding progress, under the burden of which ornithology now labors.

ÆSTRELATA HÆSITATA (Kuhl) Coues.

Procellaria hæsitata, Kuhl. Mon. Proc. Beit. Zool., 1820, p. 142, No. 11. [Excl. synon.]—Temminck, Planches Colorées, No. 416.—Lesson, Traité Ornith. 1831, p. 611, [Excl. synon.]—Newton, Zoologist, x. 1852, p. 3691.—Schlegel. Mon. *Proc.* Mus. Pays-Bas, 1863, p. 13.

Æstrelata diabolica, Bonaparte, Consp. av. ii. 1835, p. 189. ex "*Procellaria diabolica*, L'Herminier."

* This procedure may seem inconsistent with the course followed in a previous paper of mine upon the *Puffins*. It is there, however, explicitly stated that the difference between *Nectris* or *Thiellus*, and *Puffinus*, is scarcely aught than that of color, and that these genera "are hardly worth retaining, except it be for convenience's sake." (Page 117; and see also pp. 122, 128, 142, 143.) The recognition of genera founded upon fuliginous color in this family is perhaps peculiarly to be deprecated; since some species are known to pass from a fuliginous unicolor to a bicolor state of plumage with increasing age; and moreover, it is by no means incontrovertibly proven that some supposed fuliginous species are not merely immature plumages of others. I most willingly relinquish the position above referred to; and am now indisposed to degrade, even upon a plea of utility, so harmonious a group as every natural genus forms.

† *Pterodroma carribæi* Carte, P. Z. S. of which I learn through the kindness of Dr. Sclater, but of whose characters I have no means of judging.

‡ The species is also included in the genus *Thalassidroma* by G. R. Gray. Examine in this connection my remarks p. 89, of the Proc. Phila. Acad. for 1864, where its affinities are shown to be with the Æstrelatean genus *Pterodroma*. By a lapsus calami the word "Fulmareæ" there appears instead of "*Æstrelateæ*."

§ Comptes Rendus, Apr., 1856., xlii. p 768.

‖ This is merely a misuse of a name of Kaup's founded in 1829 upon the *Pr. glacialis*, Linn., and therefore a synonym of *Fulmarus*, Leach, of 1825. (Steph., Shaw's Gen. Zool. 1825, xiii. p. 233.)

Procellaria meridionalis, Lawrence, Ann. Lyc. Nat. Hist., New York, iv. 1848, p. 475.—Id. Ibid. v. 1852, p. 220, pl. xv. Id. B. Amer., 1858, p. 827. [Ex *Proc. brevirostris* Lawr. olim.]

Fulmarus meridionalis, Bonaparte, Tabl. *Gav.* Compt. Rend., 1855. *Puffinus L'Herminieri*, Lesson, fide Bp. "Cat. Mus. Av. Rocheforte, 1843, p. 97, sp. 5958."

Procellaria rubritarsi, Gould, (nomen ined. supprimend.)

Habitat.—Atlantic ocean, coasts of America and Europe. The most boreal of the bicolor species of the genus, and the only one hitherto detected on our shores.

*Form.**—The bill is about as long as the tarsus; much shorter than the skull; longer than the middle toe; very stout; but slightly higher than broad at the base; moderately compressed in the rest of its extent. The lateral lamina is very strong and large, a little inflated, short, very deep at the base. The unguis is large and strong, and its convexity begins almost from the end of the nasal case, leaving but a very brief and very concave culmen proper. The commissure is extremely sinuate, having several different curves. The unguis of the lower mandible is also strong, its point a little decurved, the gonys convex, the angle at the symphysis acute but not very prominent. The sulcus on the side of the inferior mandibular ramus is distinctly marked. The nasal case is in length about a fourth of the culmen; broad, depressed, scarcely carinate; the orifice large, subcircular; apex a little obliquely truncated; each naris oval, with a distinct septum which reaches to the end of the case. The frontal feathers overlap the base of the bill, and descend in a nearly straight line on the sides; thence rapidly retreating backwards. The feathers on the side of the lower mandible extend much further than to a point perpendicularly beneath the furthest extension of those on the upper. The interramal space is fully feathered.

The folded wings reach a little beyond the end of the tail; the first primary is longest; the second nearly equal; the rest rapidly graduated.

The tail is very long, being contained scarcely more than twice in the length of the wing from the carpal joint. It is very cuneate in shape; the central feathers sometimes even projecting slightly beyond the rest. The difference between the median and outer pair of rectrices is fully one and a half inches.

The tarsi are moderately stout, and very regularly reticulated with small sub-hexagonal plates; largest on its interior aspect. In length it about equals the middle toe without the claw. The outer toe is a little longer than the middle; but the claw of the latter is so much longer than that of the former, as to make the tips of the two about equal to each other. The tip of the inner claw just reaches the base of the middle one. The latter is a little dilated on its inner aspect. Hallux of the usual shape.

Color.—On the crown of fully adult birds there is a vertical central area or "calotte" of blackish brown. The more mature the bird, the smaller is this spot, and the more trenchantly are its edges defined against the white which surrounds it on all sides. But in young or immature birds,—in fact, in the majority of all the specimens we examine,—this perspicuous definition of the dark area is interfered with in this wise: on the front many of the feathers are brownish black, producing a spotted or variegated appearance; and the same dark color, usually somewhat diluted in tint, extends from the crown on to the occiput, nape, and even adown the back of the neck, until it may coalesce with the color of the back. On the sides of the crown the dark color may be generally distributed, merging into the transocular fascia of dark color which always exists. This latter band of color which passes through the eye is in adult birds well defined, and quite distinct from the calotte. In all ages and plumages it is somewhat darker in tint than the crown itself.

* The description is taken from a specimen in the Philadelphia Academy; with which is also compared Mr. Lawrence's type of *Procellaria meridionalis*.

These simple facts regarding the varying extension of the dark colors of the head and neck, in a species which otherwise is not known to differ materially in plumage, have given rise to descriptions so worded as to be apparently quite in conflict with each other.

Back a nearly uniform clear bistre brown: but most of the feathers often have slightly lighter margins of an ashen hue. The shade of brown of the back deepens on the wings and wing coverts into blackish brown; which is especially intense in color on the outer webs of the primaries; their inner vanes being fuliginous brown.

The distal half of the tail is like the wings in color: the basal half is white, except the outer web of the exterior feather, and to a less extent some portions of the outer webs of the two next ones. A few of the shortest, most anterior upper tail coverts are colored like the back; the rest are white. On the sides of the flanks a few feathers are touched with brown.

The upper tail coverts; the forehead. lores, sides of head, neck,* under wing coverts, (except the row just along the edge of the wing), axillars and whole under parts are white.

Bill black; iris brown; tarsus, first joint of toes, and contained portion of webs flesh-colored;† rest of webs and toes, with claws and hallux, black.

In the young bird, the colors generally are rather darker, and tending more strongly towards smoky brown; but I have never seen a specimen entirely dark-colored below, though such a state of plumage may be found. The head and neck all around, and upper part of the breast, may be concolor with the back, as described under the young *Lessoni*.

Dimensions. Bill (chord of culmen) 1·45. Nasal tubes ·33, (a little more or less). Height of bill at base ·68; width ·60; depth at greatest convexity of unguis ·60. Wing (average) 12·00; tail 5·50 to 5·75. Tarsus 1·45: outer toe and claw 2·12; middle do., the same; inner 1·75. Gradation of tail about 1·50.

The subject of the present article bears an intimate resemblance to no other species of Petrel; and, on this account, it is the more surprising that its synonymy should have become so involved as it will be evident is the case from the succeeding remarks on its bibliography; and, particularly, it has no sort of resemblance to the *Adamastor cinereus*, to which its name of *hæsitata* has been so often misapplied. Moreover, the species, so far as we know, is not subject to as great changes of plumage as many others of the genus; its general aspect, as regards color, is not that of the other congeneric species, but rather of *Puffinus major;* and why, therefore, its synonymy is so involved is a difficult matter to conjecture.

Bibliography. The first definite reference to this species which I have found is the *Proc. hæsitata* of Kuhl, as above cited. The description given by this author is entirely pertinent, both as to colors and dimensions; in fact, some expressions quite exclude any other species. Dr. Kuhl also speaks of his specimen as being "in musæo Bullockiano, nunc in Temminckiano," so that, very probably—though I can by no means speak with certainty—his bird was the very individual which furnished the subject for Pl. Col. 416 of Temminck; an accurate figure now universally referred to as representing this species.

At the outset we thus have a very definite starting-point in discussing the synonyms of this species; but, most unfortunately, Dr. Kuhl adduces as synonyms of his *hæsitata* two references‡ to Forster's unpublished drawings, and cites Forster as authority for the species. Whereas, neither of these drawings refer to the bird now under discussion; and the first *published* use of the

* Neck all around (adults): on sides only (young:) white.

† Dull yellowish in the dried state.

‡ "Forster, tab. 97;" and "tab. 98, sub nomine Procellariæ leucocephalæ." Mr. A. Newton, (Zoologist, x. p. 3696,) tells us that No. 97 is the *mollis* of Gould, called *hæsitata*: No. 98, the *Lessoni* of Garnot, called *leucocephala;* and without opportunity of examining these drawings, I rely upon Mr. Newton's authority.

name *hæsita'a* by Forster was to indicate a very different bird;* not an *Æstrelata* at all, but one of the *Puffineæ*. These unfortunate citations have ever since been the cause of a sort of double employ of the name by ornithologists. The synonyms at the head of this article, taken in connection with those given under *Adamastor cinereus*, (Pr. A. N. S., 1864, p. 119,) contain most of the references of consequence which bear on the question.

One must not fail to consult in this connection Mr. A. Newton's very thorough and lucid exposition of the bibliography, as well as an accurate description, of this species, given in the "Zoologist," as above cited, on the occasion of the first introduction of the bird into the British Avifauna. Some very important corrections and verifications are there presented.

The name *hæsitata* Forst. had been long in existence, in manuscript, for a species very different from the present; but being first published, (in 1820, when we first gained the right of recognizing it,) by Dr. Kuhl, for the species now under consideration, it must necessarily stand in this connection. I do not see, therefore, why Bonaparte supersedes it by *diabolica* of L'Herminier. This latter quotation, as well as the reference to a *Puffinus L'Herminieri* of Lesson, I present on the authority of Bonaparte, not having the opportunity of verifying them personally. The name "rubritarsi" of Mr. Gould is to be suppressed as unpublished by him, and, moreover, as conveying an erroneous impression regarding the color of the feet.

The *hæsitata* of Lesson's Traité, p. 611, is this species; but the author erroneously cites *hæsitata* Forst. and *leucocephala* Forst. as synonyms.

I have before me the type specimen of *Procellaria meridionalis*, kindly transmitted to me for examination by Mr. Lawrence. It is an example of *Æstrelata hæsitata*; as, indeed, Mr. Lawrence himself suspects may be the case. (B. N. Amer., text of p. 827.) Any differences which may exist in the specimen in question, from the figure given by Mr. Newton in the Zoologist, seem rather accidental than real. This same individual had been formerly called "brevirostris" by Mr. Lawrence—a name preoccupied by M. Lesson for a fuliginous species of "*Pterodroma*." Mr. Lawrence enumerates with entire accuracy the synonyms of this species under head of *Proc. meridionalis*, in the Birds of North America, p. 827. The name *hæsitata*, as employed by Mr. Lawrence, and also by Mr. Gould, refers to the *Adamastor cinereus*, and not to the present species.

I have not met with any names or descriptions published during the eighteenth century which are definitely referrible to this species; and, if there be any other synonyms than those above commented upon, they have not been brought sufficiently into notice to r quire recognition in this connection. The chief point is to be able to decide, without hesitation, to what *hæsitata*, as used by different authors, really refers.†

ÆSTRELATA LESSONI (Garnot) Cassin.

Procellaria Lessoni, Garnot, Ann. Sc. Nat., 1826, vii. p. 54, fig. 4, (mala.) South Pacific, Cape Horn, lat. 52°, long. 85w. Lesson, Traité Orn., 1831, p. 611. Gould, B. Aust., pl. 49, (accuratissima et pulcherrima.) Reichenbach, Syst. av. tab. 24, fig. 2605; et tab. 20, fig. 339, and of authors generally.

Æstrelata Lessoni, Cassin, Cat. Bds. North Pac. U. S. Expl. Exped. in Pr. A. N. S. Ph., 1862, p. 327. South Indian Ocean.

Rhantistes Lessoni, Bonaparte, Comptes Rend. xlii. 1856, p. 768.

Procellaria leucocephala, Forster, Ed. Licht. Descr. Anim., 1844, p. 206, sp.

* To wit, the *Adamastor cinereus*, ex *Proc. cinerea* Gm. Lath. Compare carefully, in this connection, my remarks, pp. 119, and 128, of the Philadelphia Academy Proceedings for 1864.

† For convenience of reference: *P. hæsitata* of Kuhl, Temminck, Lesson, Newton, Schlegel, Bonaparte, and of some other authors, is the *Æstrelata hæsitata* of this paper. *P. hæsitata* of Forster, Gould, Reichenbach, Lawrence, is the *Adamastor cinereus* of Pr. A. N. S. Ph., 1862, p. 119.

177. New Holland to Cape Horn. Gould, Am. et Mag. Nat. Hist. xiii. 1844, p. 363. From Cape of Good Hope to Van Diemen's Land.

Æstrelata leucocephala, Bonap. C. A., 1856, ii. p. 189.

? *Procellaria alba*, Gmelin, S. N. i. pars ii. 1788, p. 565. Vieill. Nouv. Dict. 1817, xxvii. p. 420.

? *Daption album*, Shaw, Gen. Zool., 1825, xiii. p. 246.

? *Procellaria variegata*, Bonnærté, fide Bp.

Procellaria vagabunda, Solander, Mss. fide Bp.

Habitat.—South Pacific and Indian Oceans.

*Form.** Bill much shorter than the skull, but slightly less than the tarsus, about two-thirds the middle toe and claw; very robust, as broad as high at the base, compressed in the rest of its extent. Unguis of upper mandible very large, strong, deep, convex, much decurved, the tip acute; the elevation of the unguis beginning so near the nasal tubes as to leave but a short and very concave extent of culmen proper. Lateral laminæ large, strong, wide, inflated, deep at the base; superior margin nearly straight, running obliquely downwards and forwards from the frontal feathers to the commissural edge of the unguis; its lower margin sharp, a little inflected, very convex in outline. The commissure is not very sinuate from the angle of the gape to the unguis. The under mandible has a very distinct and deep lateral sulcus, which is widened at both ends. The inferior unguis is large and strong, its tip much decurved and acute, its gonys very concave, its angle at the symphysis prominent but not acute. The outline of the inferior mandibular rami is a little concave; the interramal space is feathered nearly to the symphysis. The nasal tubes are short, broad, somewhat depressed, their outline nearly straight and ascending a little from base to apex; the latter obliquely truncated and emarginated. The frontal feathers overlap the culmen, nearly in a straight line or with a slightly convex outline; thence immediately retreating gradually backwards as they descend the sides of the bill. Those on the lower mandible do not extend further than a point perpendicularly below those on the culmen.

The wing is of the ordinary length and shape. The tail is comparatively a little shorter and less graduated than in *hæsitata*, and is contained a little more than twice in the wing from the carpal joint.

The tibiæ are feathered to within half an inch of the joint. The tarsi are short, about three-fifths the middle toe and claw, moderately stout, but little compressed, with the usual small subhexagonal reticulations. The tip of the inner claw just reaches the base of the middle one. Outer toe longer than the middle; but the tip of its claw does not quite reach to the tip of the middle one. Claws all long slender, little curved, acute, compressed, the middle one somewhat dilated on its inner edge. Hallux short, slender, straight, acute, conical, sessile.

Color. Bill pure intense black. Tarsi, and basal half or more of the toes and webs flesh-colored; yellowish when dried. Rest of toes and webs, including the whole aspect of the outer toe, blackish.

The head all around and the whole under parts are pure white. But a well-defined bar of slaty or cinereous black passes through the eye. The upper tail coverts and superior surface of the tail are clouded with light grayish cinereous. On the nape the white of the head begins to be shaded with pearly gray which deepens as it descends adown the back of the neck on the interscapulars and dorsal parts generally into grayish slate; which again lightens on the rump. This color varies much as to intensity or dilution; but is never as dark as the wings. Both surfaces of the wings are deep slaty black: the greater coverts inclining to dark slaty gray: the under surface rather duller in color than the upper; the prevailing color changing gradually

* These descriptions of old and young are from specimens in the Philadelphia Academy and Smithsonian Institution.

into dull brownish gray on the edges of the inner webs of the primaries. Some of the under wing coverts are edged and tipped with grayish white. A few of the long axillars are chiefly white with their terminal portions slaty.

The preceding description is taken from a specimen from the South Indian Ocean, mentioned by Mr. Cassin in the Proceedings, as above cited. The following is from one of the specimens taken by Mr. Peale, one of the naturalists of the United States Exploring Expedition under Com. Wilkes. The specimen in question is labelled in Mr. Cassin's hand-writing "*P. Lessonii* Garnot:" and while absolutely identical in form with the species as usually known and recognized presents the following exceedingly different colors:—

Young. No. 15709, Smiths. Register. Terra del Fuego, T. R. Peale. Entire upper parts dusky fuliginous brown; the dorsal feathers usually with somewhat light margins; the color deepening on the wings and tail into brownish black. Some of the secondaries, tertials and upper coverts have a slight cinereous tinge. On the head and nape the brown is lighter than elsewhere; and a somewhat diluted shade of this color extends adown the throat, thus completely enveloping the head; and occupies likewise the upper half of the breast, quite across, as well as all the sides under the wings. On the crissum, and especially on all the under tail coverts except immediately around the anus, the color again deepens into brownish black. The rest of the under parts are white. The circumocular region is darker than the adjacent parts.

The foregoing is the most immature plumage known to me, and it will be noticed that not only the colors themselves, but the pattern of coloration is radically distinct from those of the adults. In some specimens is recognizable a faint shade of a darker color on the tips of the feathers of the otherwise white under parts; whence I infer that in very young birds the whole under parts may be brownish or grayish.

Dimensions. Chord of culmen 1·50; width or height at base ·60; nasal tubes ·25; from feathers on side of lower mandible to its tip 1·15; along rictus 2·00. Tarsus 1·65; middle toe and claw 2·50; outer do. 2·40; inner do. 2·10. Wing 11·50 to 12 00. Tail 5·00 to 5·50. Graduation of lateral feathers rather more than an inch.

Synonyma. Among the older authors, I only find one name—*alba*, of Gmelin and Latham—which seems at all referrible to this species. *P. alba* is evidently an *Æstrelata*, of about the size of *Lessoni*, and the colors as described apply tolerably well to a somewhat immature example of this species. But there is nothing in the diagnoses of either of these authors which absolutely restricts the name to the *P. Lessoni;* and, therefore, in the uncertainty, I would by no means supersede M. Garnot's appellation *Lessoni*, the description of which is quite pertinent. I believe Mr. Cassin, in the Proceedings of the Philadelphia Academy, as above, was the first to refer the bird to its proper genus.

The *Procellaria leucocephala* of Forster is certainly this species. His description is in every respect pertinent to the adult bird. Although the name had been used, in manuscript, as applied to Drawing No. 98, for many years, it was not published until 1844, and, consequently is antedated by *Lessoni* of Garnot, (1826). Forster's editor, Dr. Lichtenstein, says, probably correctly, that *leucocephala* Forst. is the *alba* Gm.; but certainly incorrectly that "vix nisi ætate differre videtur a *Proc. hæsitata* Forst.;" whereas *hæsitata* Forst. is not even congeneric with *leuc cephala.*

I am unable to discuss the synonyms *variegata*, Bonnærté, and *vagabunda* Solander, which I quote on the authority of Bonaparte.

ÆSTRELATA ROSTRATA (Peale) Gray.

Procellaria rostrata, Peale, Zool. U. S. Expl. Exped. 1848, p. 296. Cassin, Ornith. U. S. Expl. Exped. 1858, p. 412.
Rhantistes rostrata, Bp. Compt. Rend. 1856, xlii. p. 768.

Procellaria (*Æstrelata*) *rostrata*, G. R. Gray, Cat. Bds. Pacif. Isl. 1859, p. 56.
Habitat.—Tahiti. (Peale.)

The following detailed description of this little known and hardly recognized species is taken from Mr. Peale's type specimen, now before me.

Form.—The bill is much shorter than the head or tarsus, about two-thirds the middle toe without its claw; exceedingly robust, especially at the base where it is as high as broad, and where its height is nearly equal to half the length of the culmen. The lateral laminæ of the upper mandible are very wide and large; especially basally, where their upper margins rise so high as to be nearly on a level with the dorsum of the nasal case, the tubes being thus almost buried between the laminæ. In consequence of this shape of the lateral laminæ the sulcus is extremely sinuate, extending from the top of the root of the nasal case to the commissural edge of the unguis, near its middle. The inferior edge of the laminæ, forming in great part the cutting edge of the upper mandible, is decidedly convex in outline. The unguis is large and strong, and its elevation, which begins almost directly from the termination of the nasal case, as well as its convexity and decurvation, are very great. The under mandible is straight, its sulcus strongly pronounced, its tip decurved and acute, its unguis large, its gonys quite concave, though there is but a slight protuberance at the symphysis.

The nasal tube is short, wide, depressed, turgid, not carinated, convex in outline both antero-posteriorly and transversely; its apex obliquely truncated, broad, depressed, not emarginated, the nares circular, separated from each other by a rather thick septum which comes forward to the very end of the nasal case. The frontal feathers encroach far upon the dorsum of the tubes, with a rounded termination, and then slope gradually backwards and downwards.* The feathers on the sides of the lower mandible do not extend to a point perpendicularly below the apex of the frontal feathers.

The wings are long, the first primary considerably surpassing the second; and when folded they reach considerably beyond the end of the tail. The latter is of moderate length, contained rather more than twice in the length of the wing from the carpus; and it is much graduated in shape.

The feet are comparatively large for the size of the bird, absolutely about equalling those of *Lessoni*, which is a larger bird. The relative proportions of the tarsus and toes are much the same as in other species. The hallux is rather long, slender and acute.

Dimensions.—Length about 14 inches, "extent 39·50," (*Peale.*) Wing 11; tail 4·75; bill along chord of culmen 1·37; heighth or width at base ·66; nasal tubes ·25; from feathers on side of lower mandible to its tip 1·20. Tarsus 1·75; middle toe and claw 2·25, outer do. 2·12; inner do. 1·80; hallux ·25. From apex of longest secondary to tip of longest primary in the closed wing 3·25.

Color.—Entire upper parts pure deep blackish brown, including the under surfaces of the wings and tail feathers; everywhere of a nearly uniform tint; but a little darkest on the outer webs and tips of the primaries, and somewhat lighter on their inner webs, especially towards their bases. This color of the upper parts extends around the sides of the head, neck and breast; but becomes on the chin, throat and breast a little paler; and includes the sides under the wings, and crissum. Rest of under parts, including the under tail coverts, pure white; the latter however have a few isolated brownish streaks. The line of demarcation between the dark and light colors on the breast is not very trenchant. The bill is black. The tarsi are pale yellow; probably flesh colored in life. A small space on the lower part of their external aspect, and the whole toes and webs (except a small yellow spot on the inner web near its base) are black.

This color of the upper parts is a pure very dark *brown*, with no mixture

*This outline of the feathers on the bill shows an approach to that seen in *Fregodroma*, and is quite different from anything that obtains in the other species of the genus *Æstrelata*.

whatever of ashen, gray or plumbeous. The distribution of colors is almost exactly that of the species of *Cataractes*.

I do not think that the plumage above given is that of the adult; it so closely resembles that of the immature *Æ. Lessoni*, which is its nearest ally. It is the only one, however, of which we have at present any knowledge.

I think it most probable that this is a valid species. There is none to which it bears any very intimate resemblance, except *Æ. incerta* and *Æ. Lessoni*. The relationships of the former will be noticed elsewhere. Compared with a young *Æ. Lessoni*, in which the size and pattern of coloration are not widely diverse, I find them to differ as follows: The upper parts of *rostrata* are of a deeper, purer brown. The under tail coverts are almost wholly white; those of *Lessoni* wholly dark colored except immediately about the anus. *Rostrata* is a smaller bird, the wing being an inch, the tail rather more than an inch shorter; but the feet are absolutely of the same size, and therefore comparatively larger. The bills of the two birds are nearly of the same length; but the radical difference in the character of the nasal tubes, the degree of turgidity of the base, and the outline of the feathers, as will be evident on comparing the descriptions given, at once distinguish them.

It is quite possible that some of the indications of older authors may have reference to this species; but in the utter impossibility of establishing any such with certainty I think it best to assign no synonym whatever.

ÆSTRELATA PARVIROSTRIS (Peale) Coues.

Procellaria parvirostris, Peale, Zool. U. S. Expl. Exp. 1848, p. 298 Cassin, Ornith. U. S. Expl. Exped. 1858, p. 411. G. R. Gray, Cat. Birds Pacif. Isl. 1859, p. 56.

Rhantistes parvirostris, Bp. C. R. 1856, lxii. p. 768.

Habitat.—Honden Island.

As in the case of *Æ. rostrata* I describe this supposed species from Mr. Peale's type specimen.

Form.—Bill much shorter than the head, but very little less than the tarsus, about two-thirds the middle toe; slender, compressed, considerably higher than broad at the base; its lateral outline about straight. Nasal tubes much as in *mollis*.* A considerable concavity of culmen between the nares and the elevation of the unguis; which latter does not rise very high, but is nevertheless very convex; much decurved, attenuated and hooked. Sulcus on side of the upper mandible curved, its convexity looking downwards, and greatest near the base of the bill, where the lateral laminæ rise high up to embrace the roots of the nasal case. Commissural edge of upper mandible strongly sinuated. Lower mandible almost exactly as in *mollis*; perhaps a trifle slenderer. Outline of feathers on base of bill just as in *mollis*.

The wings are exceedingly long, when folded much surpassing the tail. First and second primaries about equal and longest. Tail of moderate length, contained about 2½ times in the wing. It is greatly graduated, the difference between the external and median rectrices being 1·25 inches.

The tibiæ are denuded for nearly half an inch. The plates on both sides of the tarsus are small, irregular and very numerous. The tarsus is a little more than three-fourths as long as the middle toe and claw. The usual proportionate lengths of the toes prevail. The claws are all small, weak and little curved. The hallux is minute, straight, not very acute.

Dimensions.—"Fourteen inches long, by 36 in extent," (*Peale.*) Wing 11; tail 4·50; tarsus 1·25; bill 1·08; outer toe and claw 1·66. From tip of longest secondaries to end of primaries 4·25. Gradation of tail 1·25.

Colors.—Entire upper parts, including both surfaces of the wings and tail, deep fuliginous brown, (with no trace of ashy or plumbeous) becoming almost black on the outer webs of the primaries, and inclining to grayish fuliginous

* The tubes of the single specimen have been so injured by pressure or otherwise that they cannot now be accurately described.

on their inner webs and towards their bases. The head, neck and breast all round are like the back, but not quite so intense in color; and the dark tint only occupies the extreme tips of the feathers; while its continuity is also interrupted by some whitish spots that show at intervals. There is no distinct line of demarcation between the dark color of the breast, and the pure white which occupies every other portion of the under parts of the bird, with the exception of a few dark brown isolated feathers along the sides under the wings and the crissum, and some streaks on the outer margins of the external under tail coverts. The bill is black; the tarsi, first digital phalanges, and included portions of interdigital membranes, are dull yellowish, but were probably flesh colored in life. The rest of the webs and toes are black.

ÆSTRELATA INCERTA (Schl.) Coues.

Procellaria incerta, Schlegel, Mon. *Proc.* Mus. Pays-Bas, 1863, p. 9.

"Wing 11 inches 5 lines; point of the wing 3 inches 9 lines. Tail: middle feathers 4 inches 10 lines; external feathers 3 inches and 3 to 5 lines. Bill: length 16 lines to 17 lines and a half; height 5 lines to 5 lines and a half. Width 6 lines to 6 lines and a half. Length of nasal tube 3 lines and a half. Tarsus 18 lines and a half. Middle toe 1 inch and 10 to 11 lines. Feet yellowish, becoming black upon the two last or the last joints of the toes, with the contained membrane. Head, neck and back brownish gray, clearer and inclining to whitish on the throat or whole under part of the neck. Back, wings and tail blackish brown. Below from the breast, white, mixed with brown on the flanks and becoming brown on the under tail coverts."

Habitat.—"Southern Oceans, New Zealand, Australia, New Caledonia." [Schlegel.]

The above is a copy of Dr. Schlegel's description of this supposed species, of which the author further says: "I have not been able to refer this species to any one hitherto described. It appears allied to the *Proc. rostrata*, Peale, * * but has the under tail coverts dark colored instead of white, and its colors generally are less brownish." It is to be deplored, that in introducing a species into so difficult a family as the present one, a more detailed description was not given.

As well as I can judge by the description, the species is about the size of *P. rostrata*, but distinguished from the latter by the different color of the under tail coverts, and a less decidedly brown tinge of the upper parts generally. It is probable also that if the bill possessed the turgidity which characterizes that of *rostrata*, together with the peculiar outline of the frontal feathers, these points would not have escaped the attention of Dr. Schlegel. The bird may pretty safely, then, be separated from *rostrata*.

I think that it is to the immature plumage of *Æstrelata Lessoni* that the species is to be referred, if it be really not valid. There were no recognized specimens of this latter species in the Museum of the Pays-Bas when *incerta* was founded. It comes in all respects exceedingly near the plumage I describe above as that of the young *Lessoni*; so much so that I fail to detect material discrepancies. Still I should not like to reduce any species founded by a competent naturalist, except by autopsy; and therefore leave it as described by its author; only desiring to call attention to the necessity of careful comparison with the plumage of the young *Lessoni*.

ÆSTRELATA NEGLECTA (Schl.) Coues.

Procellaria neglecta, Schlegel, Mon. *Proc.* Mus. Pays-Bas, 1863, p. 10.

"Colors of the plumage and of the feet as in *P. incerta*. But much smaller in size and with the shafts of the quill feathers whitish. Wing 10 inches and 6 to 11 lines; point of the wing 4 inches and 1 to 10 lines. Tail 3 inches and 8 to 11 lines. Bill: length 13 lines and a half; height 4 to 5 lines; width 5 lines and a half to 6 lines and a half. Length of nasal tubes a little over 2 lines. Tarsus 17 lines to 17 and a half. Middle toe 19 lines to 19 and a half."

Habitat.—"Pacific Ocean. Kermadec Islands. Sunday Island." [Schlegel.]

I can offer no opinion concerning this supposed species, except to state that it may possibly be, as Dr. Schlegel himself seems inclined to suspect, the *Æstrelata parvirostris*. But this latter species itself is so very near *mollis* Gould, that it may hereafter prove to be only a state of plumage of the latter.

ÆSTRELATA SOLANDRI (Gould) Coues.

Procellaria Solandri, Gould, P. Z. S., March 26, 1844, p. 57. Gould, Ann. and Mag. N. H. xiii. 1844, p. 363. Gould, Introd. Birds Aust. 1848. p. 116.
Cookilaria Solandri, Bonaparte, C. A. 1855, ii. p. 190.
Procellaria melanopus, Natterer, fide Gould. (Not of Gmelin.)

"Head, back of the neck, shoulders, primaries and tail dark brown; back, wing coverts and upper tail coverts slate-gray, each feather margined with dark brown; face and all the under surface brown, washed with gray on the abdomen; bill, tarsi, and membranes black.

"Total length 16 inches; bill $1\frac{3}{4}$; wing 12; tail $5\frac{1}{2}$; tarsi $\frac{3}{4}$; middle toe and nail $2\frac{3}{8}$."

The preceding is a copy of Mr. Gould's description of this species. This author further says of it. "This is a remarkably robust and compact bird. I shot a single individual in Bass' Straits, on the 13th of March 1839. M. Natterer thought that it might possibly be identical with the bird figured in Banks' drawings, and to which Dr. Solander has affixed the term *melanopus*, an opinion in which I cannot concur. I have accordingly named it in honor of that celebrated botanist. The specimen above described may possibly prove to be not fully adult, as the dark coloring of the under surface only occupies the extreme tips of the feathers—the basal portions of which are snow-white."

I have not enjoyed an opportunity of examining a specimen of this species, and none, so far as I am aware, are contained in any American collection. It appears to be exceedingly distinct from any other species of *Æstrelata*, if not in colors at least in proportions of bill and feet, as compared with the absolute size of the bird. The dimensions of these parts as given by Mr. Gould,—particularly the shortness of the tarsi, as compared with the lengths of the toes, are quite different from that of any other species of the genus; so much so that the bird may not be a true *Æstrelata*; upon which point however I cannot now give a definite opinion. The type of the species is doubtless, as Mr. Gould surmises, not fully adult; and when mature the dark coloring of the under parts will in all probability disappear, leaving the whole inferior regions of the body white. The unicolor pattern of the feet is diverse from the ordinary style which prevails in nearly all the species of the genus.

By Bonaparte the species is referred to his "genus" *Cookilaria*, though for what reason is not obvious, since Mr. Gould particularly notes that his species is a "remarkably robust and compact bird," while the type of "Cookilaria" is the *leucoptera* Gould; almost the very smallest and most gracefully formed species of *Æstrelata*. Dr. Schlegel's identification of *Solandri* with *grisea* of Kuhl is elsewhere commented upon.

ÆSTRELATA GRISEA (Kuhl) Coues.

Procellaria grisea, Kuhl, Mon. *Proc.* Beit. Zool. 1820, p. 144, No. 15, fig. 9. But not of Latham.* Schlegel. Mon. *Proc.* Mus. Pays-Bas. 1863, p. 12; (excluding synonymy.)

* Lath. Syn. 1785, iii. part ii. p. 392, No. 4. "Size of a jack-daw; length 14 or 15 inches. Bill 2 inches long, and brown; the whole plumage black or sooty; the under wing coverts white, with black shafts; the wings rather exceed the tail in length; the forepart of the legs greenish blue. The specimen in the Leverian Museum has the chin and throat of a whitish color. Inhabits the southern hemisphere from 35° to 50°. Seems much allied to the Black Petrel." (*æquinoctialis*.)

This is a species of Latham's which has not so far as I am aware been identified by later writers: and I find it quite impossible, from the above meagre indication, to come to any definite conclusion regarding it. It is, however, in all probability some species of *Nectris*, of the *Puffinæ*; so that we need not therefore be prevented from using Kuhl's name of *grisea* for a bird of the genus *Æstrelata*.

Procellaria lugens, Forster, icon. 21, according to Kuhl. Banks, tab. 21 and 22, "ubi rostri forma optime est delineata" according to Kuhl.

"*Æstreluta inexpectata*, Forster," of Bonaparte's Conspectus, ii. p. 189. But not the true *inexpectata* of Forster which is doubtless *mollis*, Gould.

"Bill much compressed. Plumage uniform gray, darkest above, and becoming blackish on the wings. Generally similar to *mollis* of Gould, but with a more compressed bill, different colors and proportions of some parts, and the feet, including the webs, brownish in the dried state. Wing 9 1-12th inches; central tail feathers 3 11-12ths, external ones 2 11-12ths. Bill 11½ lines long: 4 high, 4½ wide. Length of nasal tube rather more than 2 lines. Tarsus 16½ lines. Middle toe 19 lines."

The preceding description is compiled from the diagnosis of a species given by Dr. Schlegel (as above cited) from the Australian seas. That writer identifies it with the *grisea* of Kuhl, and gives *Solandri* of Gould as a synonym. I am unacquainted, autoptically, with any species differing from *mollis* Gould, by the characters as given by Dr. Schlegel. That gentleman, however, has a specimen indicating such a species, and upon the competent authority of the accomplished Director of the Pays-Bas Museum, I recognize the species as distinct from *mollis*. The color of the plumage I do not think can be regarded as a constant and valid character, since some ages of *mollis* present exactly the tints described as those of *grisea*. The species must therefore be separated, if at all, by the more compressed bill, different colors of the feet, and different proportions of some of the parts. Taking Dr. Schlegel's description and specimen as the only tangible basis on which the supposed species I am now treating of rests, there are presented for our consideration the following points of synonymy.

Attentive study of Kuhl's description of the bird he calls "*grisea* L.," and examination of his figure (fig. 9) will show clearly that it is by no means the species described by Latham under the name of "Gray Petrel, *P. grisea*." Latham gives the bill as two inches long, while Kuhl's figure delineates a bill measuring just one inch along the chord of the culmen. Other discrepancies are palpable throughout. Latham's *grisea* appears to be a *Nectris*, while Kuhl's is an *Æstrelata* very near *mollis*. Kuhl himself takes occasion to note some descrepancies between his bird and Latham's.* Kuhl's expressions "rostro valde compresso; * * corpore et tectricibus alarum inferioribus cinerascente fuliginosis, pedibus pallidis" together with his measurements, are entirely pertinent to the bird whose characters are given by Dr. Schlegel; so that the only question is the distinctness of the species from *mollis*.

While I thus entirely agree with Dr. Schlegel in this identification of Kuhl's name, I can by no means assent to the referring of Mr. Gould's *P. Solandri* to this species. *P. Solandri* is certainly radically distinct; and so different in its proportions that I cannot understand how Dr. Schlegel could have reconciled it with *P. grisea*.

Dr. Kuhl (l. c.) says of the *P. lugens* of Forster (ic. 21) that he considers it the same as *grisea*; he also adduces *P. lugens* Banks, (tab. 21 and 22,) as a synonym of the latter. My quotation of these names is entirely upon Dr. Kuhl's authority.

The *Æstrelata inexpectata* of Bonaparte's Conspectus evidently belongs here rather than to the true *mollis*. The author quotes Kuhl's *grisea* as a synonym; and the diagnosis he gives presents nothing incompatible with the present species. The true *inexpectata* of Forster is, I think, *mollis*, as I attempt elsewhere to demonstrate.

As a summary of the preceding remarks I may state that if there be a spe-

* "In exemplari meo haud observari quod Lath. de inferioribus alarum tectricibus dicit."—Kuhl. p. 144.

cies of *Æstrelata*, closely allied to *mollis* but permanently differing from it by those characters laid down by Dr. Schlegel, and of which the specimen in the Museum of the Pays-Bas is an example, then the synonyms adduced at the head of this article are most properly to be referred to this species; but otherwise they must be considered as appertaining to *mollis*.

ÆSTRELATA MOLLIS (Gould) Coues.

? *Procellaria melanopus*,* Gm. S. N. i. p. 562. Lath. Syn. iii. p. 409, No. 12. Vieill. Nouv. Dict. xxvi. 1817, p. 420. ? *Puffinus melanopus* Steph. Zool. xiii. p. 231.

Procellaria inexpectata, Forster, Descr. Anim. ed Licht. 1844, p. 204, No. 177. Not *Æstrelata inexpectata* of Bp. Consp. which rather appertains to the "*grisea* Kuhl" of this paper.

Procellaria mollis, Gould, Ann. et Mag. N. H. 1844, xiii. p. 363. Id. Birds Aust. vii. pl. 50. Cassin U. S. Ex. Exped. Ornith. 1858, 410. Schlegel, Mon. Proc. Mus. Pays-Bas, 1863, p. 11.—And of later authors generally.

Cookilaria mollis, Bonaparte, C. A. 1855, ii. p. 190.

Rhantistes mollis, Bonaparte, Comptes Rendus, xlii. 1856, p. 768.

? *Procellaria gularis*,† Peale, Zool. U. S. Expl. Exped. 1848, p. 299.

? *Procellaria Phillipii*, G. R. Gray, Ibis, 1862, iv. p. 246.

? *P. crepidata; P sandaliata*, Solander, according to Bp.

Habitat.—South Pacific and Antarctic Oceans.

Form.‡ Bill as long or slightly less than the tarsus, nearly equal to the middle toe without its claw; compressed, a little higher than broad at the base. In the details of its shape it does not differ from the typical species of *Æstrelata*. The proportions of tarsus and toes are also as in other species of the genus. The tail is only moderately rounded, instead of being decidedly cuneate with some projection of the median rectrices, as in *Æ. hæsitata*; its length is contained in that of the wing from the carpal joint slightly more than twice. The folded wings reach considerably beyond the tail. The species in size and general contour of the body approaches *Daption capensis*.

I do not notice that the plumage is softer, fuller, or more mollipilose than in some other species of the genus.

Color. There is a transocular black fascia, the greater part of which lies below the eye. The clear ashy gray of the upper parts extends over the vertex, becoming more or less mixed with white on the front and cheeks, according to age. Most of the feathers of the back have slightly paler margins. The primaries are nearly concolor in all their extent; (compare description of No. 15,706 Smithsonian Collection, infrà;) being only a little duller or more fuliginous on their inner webs. The under surface of the wing is chiefly dusky brownish; but there is an illy-defined and interrupted area of whitish, particularly towards the bases of the primaries. The upper tail coverts and tail are chiefly concolor with the back; but some of the outer rectrices are marbled with white.

In the majority of specimens the color of the back extends on the sides of the breast for a considerable distance; sometimes quite across the middle; but in very adult birds most of the breast is pure white. The color is produced by a clouding of the tips only of the feathers, their basal portions be-

* The following is Gmelin's diagnosis: "13 pollices longa. Vertex, cauda rotundata, et alæ totæ obscurè nigræ; dorsum ex atro paullisper canescens; membrana digitos connectens parte sui ulteriore, digitorumque articuli, nigri.

† *Teale, as above.* "Above cinereous brown; tail and breast plumbeous; throat, under wing coverts and under tail coverts white. Primaries and spurious quills nearly black with brown shafts; tail light beneath: two outer feathers mottled with white, * * whole under plumage white at the ro ts; bill blue-black. Length 18; extent 34; wing from carpal joint 10½; bill one inch; tarsi 1·20: outer toe 1·60; tail 3·40."

‡ Description from typical examples, received from Mr. Gould, in the Philadelphia Academy.

ing white; and often is not uniform in tint, but is minutely undulated or punctulated with lighter and darker shades.

The front, lores, lower part of cheeks, and whole under parts, including the lower tail coverts, are white. The lateral rectrices are on their inferior aspect chiefly white, with some light cinereous marbling.

In general terms it may be stated that the older the bird, the clearer and purer is the cinereous, and the more trenchantly defined are the boundaries of the several differently colored areas; the difference in this respect being especially notable in the forehead and sides of the breast.

Young birds are all over of a pretty uniform deep brownish ash, or fuliginous cinereous; inclining to smoky brown on the wings and tail. The whole under parts are not notably different from the back, though, however, the dark color only occupies the tips of the feathers; their basal moiety remaining white. The transocular dark fascia is always present. But the chin and face are much mottled with whitish; and in specimens otherwise wholly dark on the under parts, the chin and throat may be chiefly white, striatulated with ashy brown.

Moulting specimens, or those in poor plumage from the age and worn condition of the feathers, show scarcely a trace of cinereous on the wings and tail, these parts being of a dull brownish, more or less tending to gray. The same tendency to brownish or grayish instead of cinereous is observable on other parts. Sometimes a pure white chin and throat coëxists with complete dusky clouding of the other under parts.*

The bill and feet hardly differ in color with age. The bill is black; the tarsus, basal half of inner toe and contained web, flesh colored; (dull yellowish when dry;) all the rest of the toes and webs, with all the claws, black.

Dimensions. (No. 1678, Phila. Acad., J. Gould.) Bill (chord of culmen) 1·10. Height at base ·45; width slightly less. Tarsus 1·33. Outer toe and claw 1·75; middle about the same, inner 1·50. Wing average 10·00: but may range from 9·50 to 10·50; tail 4·50; the graduation of the rectrices about 1·30. These are nearly the average dimensions of six examples.

There is a specimen, No. 15,706, in the Smithsonian Museum from the Antarctic Ocean, by Mr. T. R. Peale, which, with the size and general appearance of *mollis* differs as follows: The under surfaces of the wings are, except just along the edges, purely and uninterruptedly white; as much so as in *C. oki*i. The inner vanes of all the primaries, instead of being simply duller and grayer than the outer, have trenchantly defined pure white areas; these white spaces occupy the whole of the webs at the base; as they extend more towards the apex they become less wide, leaving a narrow space of dark color along the inside of the shafts; apically they terminate with an acutely pointed outline, which stretches towards the tip of the feather, and is bounded internally and externally by dark colored portions of the feather. The general pattern is exactly that seen in the primaries of most *Lari*; and the definition of the two colored areas is as strict. In other respects the bird is like a quite young *mollis*, being dark colored both above and below; but the tint of the clouding below is more intensely sooty than in any specimen of typical *mollis* I have seen; and there is this peculiarity in addition, that the under tail coverts remain pure white.

I do not wish to introduce a new name upon the above basis; though possibly in any other family than the very one of the Petrels I would do so. The points which would constitute its specific characters are elucidated in the preceding paragraph; and should the differences above pointed out be substantiated as persistent in other specimens, it would, I think, then be proper for the ornithologist who makes the verification to formally introduce the species. The specimen in question before me is the only one contained in the United

* In which condition is the type of "*gularis*," Peale.

States Wilkes' Exploring Expedition collection; and is, therefore, in all probability, the very individual upon which Mr. Peale based his description of *gularis*; which name should, therefore, stand for the species, in the event of its proving valid; even though Peale's description does not notice the peculiar markings of the primaries.

Bibliography. It is possible that the *P. melanopus* of Gmelin and Latham was based upon this species. Their bird evidently was an *Æstrelata*, and "thirteen inches long;" and the description of the colors would apply pretty well to an immature *mollis*. But *mollis* has a bill by no means an inch and a half long; and is not found, so far as we know, "circa Americani septentrionalis." The only known North American species of *Æstrelata* is the *hæsitata*; of which the bill is nearly of the length stated by Latham. Under the circumstances, I do not think this name is to be adopted for either species.

I think there can be no doubt that the *inexpectata* of Forster is really this species. I find no points of the description, nor any of the measurements, at all incompatible with this supposition. Dr. Lichtenstein refers *inexpectata* to *grisea* of Gmelin; certainly incorrectly, whatever may be its relations to *grisea* of Kuhl.

The name *mollis* Gould bears the same date of publication as *inexpectata*, (1844): so that it is difficult to say which actually has priority. I think, if any choice is allowed us, we should, by all means, use *mollis*, so definitely characterized and well known. Mr. Gould, in describing the species, says that it had been identified with *lugens* of Banks, and with *grisea* of Kuhl (nec Gm.) This may very possibly be the case; although, for the present, I give *grisea* Kuhl, (of which *lugens* Banks is a synonym,) as a distinct species, for reasons stated elsewhere.

In the Ibis, as above, Mr. G. R. Gray has a species *P. Phillipii* from Norfolk Island; based upon the "Norfolk Island Petrel," Phill. Bot. Bay, p. 161; with *P. alba*, var. Lath., and *P. mollis* Gould, as synonyms, the latter queried. No description is given, and I merely follow Gray himself, in placing the name as a queried synonym of *mollis*. Vieillot, (Nouv. Dict., xxvi. 1817, p. 420,) refers to this same "Norfolk Island Petrel."

ÆSTRELATA COOKII (Gray) Cones.

Procellaria Cookii, G. R. Gray, Fn. N. Z. App. Dieff. Trav., 1843, ii. p. 199.—Id. Voy. Ereb. and Terror, pt. iii. 1844, pl. 35.—Id. Sclater's Ibis, 1862, iv. p. 246. Cassin, U. S. Expl. Exped. Ornith., 1858, p. 414, and of authors.

Rhantistes Cookii, Bonap. Compt. Rend. xlii. p. 768.

Procellaria leucoptera, Gould, P. Z. S. xxii. 1844, p. 57.—Id. Ann. Mag. N. H. xiii. 1844, p. 364.—Id. Birds Aust. pl. 51.

Cookilaria leucoptera, Bonap. C. A. 1855, ii. p. 190.

Cookilaria velox, Bonap. C. A., 1855, ii. p. 190, ex *Pr. velox* of Solander. Not *velox* of Banks, supposed to be one of the *Prioneæ*.

Rhantistes velox, Bonaparte, Compt. Rend. xlii. 1856, p. 768.

Procellaria brevipes,* Peale, Zool. U. S. Ex. Ex. Bds., 1848, p. 294.

Habitat.—Southern Oceans, at large.

Form.† Bill much compressed, except at the extreme base, where it is nearly as wide as high; much shorter than the skull; about equal to the tarsus; one of the most slender in general shape of this genus. The lateral superior sulcus is nearly straight, being only a little sinuate; the outline of the inferior mandibular rami and of the gonys both a little concave, the pro-

* *Peale, as above.* "Head and wings sooty black; tail and back gray; throat, breast, and belly white, tinged with salmon color when living; interrupted plumbeous band across the breast; two outer tail feathers light gray, white beneath; shafts white; all the others brown; under wing coverts white; lesser ones nearly black. Bill black; feet pale flesh; toes black at their ends. Length 10·70; extent 24·25; culmen nineteen-twentieths; middle toe and claw 1.30."

† From specs. in Philada. Acad. and Mus. Smithson.

tuberance at the symphysis acute, if not very prominent. The commissure is, as usual, very sinuate. The nasal case is contained nearly four times in the length of the culmen; broad, depressed, its dorsal outline straight, its apex very obliquely truncated, its orifice subcircular, each naris oval; the septum of considerable thickness, and coming forward to the very end of the case. The frontal feathers do not extend at all forward on the base of the culmen, but embrace the sides of the bill as extensively as they do its base above; and thence they slope very rapidly backwards, making a considerable angle just above the edge of the commissure.

The wings are sufficiently elongated to extend, when folded, a little beyond the end of the tail, which is, itself, rather longer than in most species of this group. The second primary is nearly as long as the first; the rest are rapidly graduated.

The tail is so long as to be only contained exactly twice in the length of the wing from the carpus, and the graduation of the lateral feathers is about as great as in *hæsitata*, (greater than in *mollis*,) though the median pair of rectrices are not specially produced. The upper tail coverts fall far short of the end of the tail: the under ones reach quite to it.

The legs are short and slender; the tibiæ bare for but a very brief space. The tarsi are considerably shorter than the middle toe without its claw, and about equal to the inner; quite slender, moderately compressed, with the ordinary recticulations. The tip of the inner lateral claw just reaches the base of the middle one. The middle and outer toes are of equal length, but the claw of the latter is much shorter than that of the former: which last is but very slightly dilated on its inner edge. All the claws are small, slender and weak, but still much curved and acute. The hallux is of the ordinary size and shape.

Dimensions. Chord of culmen 1·00; height of bill at base ·35 to ·40. Length of nasal case ·25. Wing 8·50 to 9·00; the distance from end of longest secondary to tip of first primary in the folded wing 2·75. Tail 3·75 to 4·25; graduation 1·00 to 1·50. Tarsus 1·10; outer toe and claw 1·25; inner do. 1·12, middle do. 1·33. From upper tail coverts to end of tail 1·40.

Color. Adult. Above blackish cinereous. On the crown of the head and its sides to a little below and before the eye, and on the nape the color tends more towards sooty brownish than to cinereous; but on the neck behind this color merges insensibly into the quite pure deep cinereous, which occupies the middle dorsal region, the interscapulars, and some of the tertials. The rump is darker and more like the crown; the upper tail coverts again being cinereous, if anything a little lighter than the back—tending to pure grayish instead of dusky cinereous. The superior surface of the tail is plumbeous blackish, lightest and most cinereous basally. Inferiorly the tail is lighter colored than on its upper surface; the lateral rectrices particularly being light plumbeous gray, almost whitish basally. The shafts of the feathers are above brown, below white, except at their extremities. The superior wing coverts and all the primaries and secondaries are brownish or fuliginous black; deepest along the edges of the wings, and outer borders and tips of the quill feathers. The inner vanes of the primaries are light grayish fuliginous, becoming grayish white towards their bases; but the transition is quite gradual. The shafts are black above, brownish beneath. All the under wing coverts are pure white, except one row, the smallest, just along the edge of the ulna and metacarpus; producing a broad uninterrupted white area. On the radial edge of the antibrachium there is a narrow but well-defined white line:* visible from both upper and under aspects of the

* This is very erroneously called a "linea *humeralis*" by Mr. Gould in one place; and spoken of as "a line along the inner edge of the *shoulder*" in another. We very often find the carpal joint most carelessly and incorrectly spoken of as the "shoulder."

wing. The front, the lores, the sides of the head nearly to the eyes; the side of the neck, and the whole under plumage, pure white. The color of the back almost always, to some degree, clouds the sides of the breast.

The above is the plumage of a very mature bird. Usually the plumage is rather as follows. The upper parts generally are less decidedly cinereous—having more of an admixture of brownish—though the upper tail coverts are quite notably plumbeous. The forehead is speckled with black: sometimes the latter color being in excess over the white. The sides of the breast are very strongly clouded with dark cinereous gray, which may reach quite to the median line; though this color is only a wash on the extremities of the feathers. Some of the feathers on the flanks, and a few of the under tail coverts are also lightly touched with plumbeous gray.

Young. The upper parts show scarcely a trace of cinereous anywhere, except, perhaps, on the upper tail coverts. The front is so much obscured by dusky that the white only appears in small sparse specks. The whole under parts are tinged with a plumbeous black hue from the breast backwards; this color being deepest on the breast where it is pure and uninterrupted; on other parts appearing as a clouding or marbling. The chin and throat in all the specimens I have seen remain almost pure white, in marked contrast to the rest of the under parts. The under wing coverts are as described in the adult: and the white line along the edge of the fore arm also exists.

It will be noted that the changes of plumage above described are quite homologous with those to which *mollis* is subject.

The bill is black. Somewhat more than half the inner web, and rather less than half the outer web, together with the tarsus, are light flesh color. The rest of the toes and webs are black. The colors of the bill and feet seem subject to little variation with age.

Synonyma. The name *Cookii* of Gray has priority by about a year over *leucoptera* of Gould; as, indeed, the latter author himself allows. That these two names were based upon the same species is not doubted, so far as I can learn, except by one author. Bonaparte would have it that the bird figured in plate 51 of the Birds of Australia, and called "*Cookii* Gray" by Mr. Gould, is not the species really so named by Mr. Gray; but another; differing slightly in size, though quite identical in color, and for which he adopts the name *velox*. In this conclusion, he is quite unsustained by ornithologists.

The specimen collected by Mr. T. R. Peale, now before me, which doubtless is the type of his *brevipes* of 1848, is an example of this species.

This little species is liable to be confounded with no other, except, perhaps, the succeeding one; under the head of which latter the apparent differences are noticed. I find no names of the older writers which seem referrible to this species; and its synonymy is less confused than that of most other components of the genus.

ÆSTRELATA GAVIA (Forst.)

Procellaria gavia, Forst. Descr. Anim. Ed. Licht., 1844, p. 148. ("P. suprâ cœrulescenti-nigra, subtus candida, palato et linguâ villis deflexis, pedibus pallide-fuscis. * * Habitat ad Æstuarium Reginæ Charlottæ. * * Corpus magnitudine circiter *P. vittatæ*. * * Alae expansæ 26 unc. rostrum in fronte 1·50; tibiæ 1·75; cauda 2·50." Forst.) G. R. Gray, Voy. Ereb. and Terr. Birds, pt. x. Oct., 1845, p. 18.—Id. Ibis, 1862, iv. p. 246. From Queen Charlotte's Sound.

This is a species which is not recognized, and, in fact, does not appear to be noticed in later systematic works. In addition to the diagnostic points quoted above, Forster describes it as having the pileum, neck behind, back, rump, thighs, tail, and upper surface of the wings, bluish black; the chin,

throat, breast, abdomen, crissum and under wing coverts white. Forster's editor, Dr. Lichtenstein, merely says of it, "inter *P. albæ* Lath. varietates latens." Mr. G. R. Gray recognizes it in the works above cited as a valid species. An accurate definition of its characters, and an exact exposition of its relationships, together with its synonyms, if it have any, are greatly to be desired.

The bird is apparently some small species of *Æstrelata*. All the points of coloration given, especially those of the under wing coverts, are quite consistent with the characters of *Æ. Cookii*. But the dimensions as stated are quite at variance with those presented by *Cookii*, those of the bill and feet being much too large, while that of the tail is too small; these dimensions being rather those of a small *Puffinus*. In view of these discrepancies, I prefer to coincide with Mr. Gray's high authority in holding it, for the present at least, as distinct; especially as its reference to any described species would be entirely upon supposition.

ÆSTRELATA DESOLATA (Gm.) Bon.

Procellaria desolata, Gmelin, Syst. Nat. i. pars. ii. 1788, p. 562, No. 14. Latham, Syn. iii. part ii. 1785, p. 409, No. 14. Latham, Ind. Orn., 1790, ii. p. 825, No. . Kuhl, Mon. *Proc.* Beit. Zool, 1820, p. 143, No. 13, fig. 7. Schlegel, Mon. *Proc.* Mus. Pays-Bas, 1863, p. 13; and of authors generally.

Daption desolatum, Steph. Shaw's Gen. Zool. xiii. 1825, p. 244.

Æstrelata desolata, Bonaparte, Consp. Av. ii. p. 189. Excl. var. *rostrata*.—Id. Comptes Rend. xlii. 1856, p. 768.

Procellaria fasciata, Bonnærté, (Gray, Cat. Bds. Pacif. Islands, 1859, p. 56).

Habitat.—Island of Desolation. New Hebrides; Kamtschatka, (Schlegel).

"Pr. ex virescente cinerea, subtus alba, remigibus caudâque rotundatâ obscuris, hac apice fuscâ. * * Rostrum nigrum apice flavicans; tempora ocularumque area alba. Summitas alarum ferè nigra; pedes fusci; membrana digitos connectens flava; ungues nigri; alis expansis fasciâ obscurâ per omne corpus ab apice ad apicem." [*Gmelin.*]

"Teintes du plumage et des pieds absolument comme celles de la *Procellaria leucoptera*, mais d'une taille beaucoup moins forte, et les pennes caudales comme les plumes sous-caudales d'une teinte foncée jusqu'à leur base. Aile 7 pouces 10 lignes; pointe de l'aile 2 pouces 11 lignes. Queue: pennes mitoyennes 3 pouces 5 lines; pennes externes 2 pouces 8 lignes. Bec: longeur 11 lignes; hauteur 3 lignes; largeur 4 lignes. Longueur du tube nasal à-peu-près de 2 lignes. Tarse 12 lignes. Doigt du mileau 12 lignes." (*Schlegel.*)

This is a species with which I am unacquainted through autopsy. It is the smallest known component of the genus, being less than the little *Cookii*. I have copied Gmelin's original indication of the species; and Dr. Schlegel's measurements of a typical example, from the Temminckian collection; the individual upon which Dr. Kuhl, in 1820, based his description. Both Gmelin and Latham speak of some portion of the bill as being yellow; which was probably an accidental feature in one specimen; for, as is well known, all the *Æstrelatas* have black bills.

This species is so small, and otherwise so well characterized, that it stands in the enviable position of having hardly a synonym, although described in the eighteenth century. I have not met with, or seen anywhere cited, a single synonym, except that of Bonnærté, above given.

ÆSTRELATA MACROPTERA (Smith) Coues.

Procellaria macroptera, Smith, Ill. S. Af. Zool. Bds., pl. 52. Gould, Ann. Mag. N. H., 1844, xiii. p. 362. Gould, Introd. Bds. Aust., p. 116, No. 591.

Ossifraga macroptera, Reichenbach, Syst. Av. t. 21, fig. 786.

Pterodroma macroptera, Bp. C. A., 1855, ii. p. 191.
Procellaria brevirostris, Lesson, Traité Orn., 1831, p. 611.
"? *Procellaria lugubris*, Tschudi," according to Bonaparte. Not of Natterer, which is a *Thalassidromine*.

Habitat.—Antarctic Oceans. Coast of Africa. (Smith). Van Diemen's Land. (Gould).

This is a species which I recognize with much doubt. Not having access to the original description by Smith, I cannot speak with certainty regarding it. It is admitted by Bonaparte, who says of it: "Ex toto fuliginoso-cinerea; rostro nigro; pedibus flavidis." On the other hand, Dr. Schlegel refers it to the *atlantica;* and the measurements of two specimens in the Pays-Bas Museum, (one an undoubted *atlantica* received from Mr. Gould, and the other a supposed *macroptera*,) by no means differ in size to a degree incompatible with specific identity. If the expression "pedibus flavidis" is correct, the species would be easily separable. As it is, the only data given by most authors are the larger size, longer wings, and grayer face, as compared with *atlantica*.

It is quite possible that the specimen upon which Dr. Schlegel unites the two names is not a veritable example of *macroptera*. Bonaparte evidently separates *macroptera* from *atlantica* on the strength of the difference in the color of the feet. Mr. Gould says of this species: "I think that a bird I killed in the seas off Van Diemen's Land, where it was tolerably abundant, and which differs from *atlantica* in being of a larger size, having much longer wings and a grayer face, may be identical with *P. macroptera* of Smith, and I therefore retain it under that appellation, in preference to assigning it a new name." Here is an instance in which an author who, in extensive and practical knowledge of the Petrels, is surpassed by no other naturalist, deems the species sufficiently distinct from *atlantica*. But it is quite possible that the bird here referred to is not the true *macroptera* of Smith; and may likely enough be an undescribed species of *Pterodroma*, different from both *macroptera* and *atlantica*, as, indeed, Bonaparte hints, (page 191, Conspectus).

On page 611 of Lesson's Traité," (1831,) there is described a *Procellaria brevirostris*, as follows: "Bec noir, court, tres recourbé; tarses jaune; plumage en entier brun fuligineux; ailes et queue noir intense. Mus. de Paris." This is evidently some species of *Pterodroma;* and upon this description, apparently, or, very possibly, upon the specimen itself in the Paris Museum, Bonaparte has drawn up his diagnosis of the species he calls "*macroptera* Smith." I cannot see why he does not employ Lesson's name, which has priority over *macroptera* Smith, provided the two are synonymous.

As a resumé of the subject, I may state that I think it quite possible there are two species confounded in the synonyma at the head of this article. One is *brevirostris* Lesson, entirely fuliginous, and with yellow feet. The other is the species referred to by Mr. Gould, as above, as distinguished from the common *atlantica* by its larger size, longer wings, and gray face. Whether the latter is the true *macroptera* of Smith remains to be proven. Dr. Schlegel may be perfectly right in referring the *macroptera* Smith to *atlantica* Gould; and yet the two species I am speaking of may also exist, distinct from each other and from *atlantica*.

By Bonaparte the *Procellaria lugubris Tschudi** is referred with a query to this species. As will be seen by the accompanying foot-note, the bird is evidently some species of *Pterodroma*; though the description is so brief and wanting in measurements that it is impossible to say to which one it is to be referred, or whether it be really a valid new species.

*Tschudi, Cab. Journ. f. Ornith., iv. 1856, p. 85. "The whole body is dark brown, the back somewhat deeper-colored than the belly; the tail wholly black; the inner side of the wing darker than the outer. Bill and feet reddish; iris ashy gray. Surpasses in size the *capensis;* also compressed in form. The description of *P. antarctica* is too inaccurate to say with certainty if it be the species here described. Between 46° and 36°."

ÆSTRELATA FULIGINOSA (Kuhl) Coues.

Procellaria fuliginosa, Kuhl, Mon. *Proc.* Beit. Zool. 1820, p. 142, No. 12, pl. x. fig. 6.—(Banks, tab. 19, fide Kuhl; Forst. tab. 93, B. fide Gould.) But not *Proc. fuliginosa*, Kuhl, l. c. species 27, page 148, (Banks tab. 23,) which is a *Nectris*. Also not *fuliginosa* Gm. Lath. which is probably a Thalassidromine species. Also not *Puffinus fuliginosus* Strick.—Forster, Descr. Anim. Ed. Licht. 1844, p. 23, sp. 18.—Not the *Nectris fuliginosa* of Forster.—Schlegel, Mon. Proc. Mus. Pays-Bas. 1863, p. 8.

Procellaria atlantica, Gould, Ann. Mag. N. H. 1844, xiii. p. 362. Id. Introd. B. Aust. p. 116, sp. 590, and of authors.

Pterodroma atlantica, Bonaparte, C. A. 1856, ii. p. 191.

Habitat.—Atlantic Ocean, particularly its southern portions.

*Descr.** Bill black. Feet dark colored. Entire plumage including the under wing coverts, fuliginous, becoming almost black on the wings and tail. Bill 1·35. Tarsus 1·60; middle toe and claw 2·20; outer do. about the same, inner do. 2 20. Wing 10·75 to 11·50; possibly to 12·00. Tail 4·50 to 5·00. Total length 15 to 16 inches.

Fine examples of this well known species are in the Philadelphia Academy, some of them typical specimens received from Mr. Gould, and labelled by him "*atlantica.*"

This species is certainly the *fuliginosa* of Kuhl's monograph (No. 12, pl. x. fig. 6.) Indeed it is seldom that the descriptions and measurements of the earlier writers are found so entirely pertinent and readily identifiable as in the present instance. The figure of the bill agrees exactly. This identification is made by both Bonaparte and Schlegel. Although the name *fuliginosa* has been applied by several other authors to different species, none of them fall in this genus or indeed among the *Æstrelatæ*. (Examine my synonyms, *supra*.) There would seem to be therefore no good reason why the name should not stand for this species, taking precedence over *atlantica* of Gould. To Dr. Schlegel is due, I believe, the credit of restoring Dr. Kuhl's name.

It is quite at variance with the usual great accuracy of Mr. Gould's identifications, that he should have said† that this species "is the *grisea* of Kuhl" (No. 15, fig. 9.) I have endeavored to show, anteà, what I think the *grisea* of Kuhl really is; but whether my identification—which is the same as that made by Dr. Schlegel—be correct or not, Kuhl's *grisea* is certainly widely different from the present species.

In my Review of the *Puffinæ*, page 124 of these Proceedings for 1864, I maintain the opinion that *fuliginosa*, Forster, sp. 18, p. 23, of Lichenstein's edition, is a species of *Nectris;* which view I am now satisfied is erroneous. *Procellaria fuliginosa* Forster is the present species, as maintained by Prof. Lichtenstein and Prince Bonaparte. Impressed with Kuhl's remark that his *fuliginosa* is "omnino diversa a *Nectri fuliginosa* Forst.," I did not discriminate between this latter name and the *Procellaria fuliginosa* Forst. p. 23 of Lichenstein's edition; whence my mistake.

I know nothing of the *Nectris fuliginosa* of Forster, nor do I attempt to identify *Proc. fuliginosa*, sp. 27, ("Banks tab. 23") of Dr. Kuhl's monograph. The latter has recently been identified by Mr. Gray with *Proc. pacifica* of Latham, which is some large species of *Puffinus* (Cat. Birds Pacif. Isl. p. 55.)

In the "Ibis" for 1862. page 245, Mr. G. R. Gray institutes a *Procellaria Parkinsoni;* which is said to be the bird of Bank's icon. ined. No. 19, and (in part) the *Puffinus æquinoctialis* of Gray's list of Anseres of the British Museum, page 160, and is compared with *æquinoctialis* as follows: "being smaller in all its proportions; the bill is nearly one-third less than that of *æquinoctialis;* the

* From specs. in Mus. Acad., Phila.
† Ann. Mag. N. H. 1844, xiii. p. 362.

body is sooty black throughout, being without the white on the mentum; the tips of the mandibles are inclined to black." This description does not show well whether the bird is a *Majaqueus* or a *Pterodroma;* the comparison with *æquinoctialis* would seem to indicate the former; while the citation of Banks' Drawings No. 19 (by Kuhl placed under his *P. fuliginosa*—which is the *Pterodroma atlantica*,) would make it a component of the latter group. The habitat of the supposed species is New Zealand.

ÆSTRELATA ATERRIMA (Verreaux) Coues.

Procellaria aterrima, Verreaux. Schlegel, Mon. *Proc.* Mus. Pays-Bas, 1863, p. 9.
Pterodroma aterrima, Bonap. C. A. 1855, ii. p. 191.
"*Bulweria aterrima*, Aliq."
"? *Proc. carbonaria*, Solander" fide Bp.

Habitat.—West coast of Africa. Bourbon Island.

A very distinct species, distinguished among its congeners by its size, and the color of the feet. The plumage as in the others of the group is uniform blackish fuliginous; the feet are yellowish, or light colored, passing into black upon the terminal moiety of the toes and the included portions of their membranes. Dr. Schlegel gives the following measurements of a typical example in the Leyden Museum, from Bourbon Island, received from Mr. Verreaux: "Wing 8 7-12 inches; point of the wing 3 5-12; middle tail feathers 3 7-12; external 2 8-12; length of bill 12½ lines; height 4½ lines; width 6 lines; tarsus 16½ lines; middle toe 17½ lines."

ÆSTRELATA BULWERI (Jard. et Selb.) Coues.

Procellaria Bulweri, Jardine and Selby, Ill. Orn. Vol. ii. tab. 65. (No date given on title page and pages not numbered.) Schlegel, Mon. *Proc.* Mus. Pay-Bas, 1863, p. 9, and of many authors.
Thalassidroma Bulweri, Gray, Gen. Birds, 1849, iii.
Procellaria anjinho, Heineken, Birds Mad. in Brewst. Journ. Oct. 1829, p. 231. (First designation?)
Puffinus columbinus, Webb and Berthelot, Hist. Nat. Canar. ii. part ii. 1836—44, page 44, pl. 4, fig. 2. (Name *Proc. columbina* on plate.)
Bulweria columbina, Bonaparte, C. A. 1855, ii. p. 194.

Habitat.—Atlantic Ocean. Coast of Africa and Europe. Dr. Schlegel has a specimen from Greenland. Very possibly to be included in the Fauna of North America.

This interesting species is the smallest of the genus, and quite distinct from its congeners not only in size but in some of its proportions. It has comparatively a longer tail than most species of the genus; bearing a proportion to the wing from the carpal joint of 4½ to about 8, or more than half. The tail is very cuneate, the difference between the median and outer feathers amounting to 1·75 inches; and the central pair themselves are considerably longer than the next. The under tail coverts,—at least in the specimen before me,—fall nearly two inches short of the end of the longest feathers, being in fact no longer than the upper ones. The folded wings hardly reach to the end of the tail. The bill is about as long as the tarsus, or the middle toe without its claw; of the ordinary Æstrelatean type; quite stout at the base, compressed throughout; the unguis large and rising almost immediately from the nostrils, and exceedingly convex; the sulcus on the lower mandible is deep and well marked; the outline of the rami is nearly straight, the gonys very concave; and there is considerable of an eminentia symphysis. The first primary is hardly if at all longer than the second. The feet present no special peculiarities in relative size or proportions; the inner toe is perhaps slightly shorter than ordinary.

The fuliginous color is deepest, being almost black, on the wings and tail;

below is lighter and more brownish; on the head has a faint cinereous wash; on the greater wing-coverts is rather paler and grayer.*

Dimensions. Chord of culmen 0·85. Tarsus slightly longer, ·90 to 1·00; middle toe and claw 1·10; outer do. about the same; inner do. 0·85. Wing 8·00; tail 4·50; graduation of lateral feathers 1·75.

This little species has been very variously arranged in the series by different authors, as will be seen by the synonyms which head this article. In my mind there is no doubt that Dr. Schlegel has correctly indicated its affinities in placing it in intimate relation with, and next after *aterrima* Verr., albeit he retains it in his somewhat extensive "genus" *Procellaria*. My own reasons for referring it to *Æstrelata* will be found in my remarks under the head of that genus.

I am not enabled to state positively what was the first specific name applied to this species, of the three which head this article. Bonaparte gives precedence to *columbina*; but MM. Webb and Berthelot, in giving this name quote *anjinho*, Heineken, (1829) as above, which must therefore have been published anterior to their own appellation *columbina*. The title page of the work where the latter name appears, bears the date "1836—44." Dr. Schlegel and most other writers give priority to *Bulweri* of Jardine and Selby's Illustrations, a work extending over a series of years. It is figured in volume ii. pl. 65; but the title page bears no date. If not published anterior to 1829 then the name *anjinho* Heineken has priority.

ÆSTRELATA MACGILLIVRAYI (Gray) Coues.

Thalassidroma (*Bulweria*) *Macgillivrayi*, G. R. Gray, Cat. Birds Isl. Pacif. 1859, p. 56. Spec. in British Museum, from the Feejee Islands, (Ngau.)

"Like *T. Bulweri*, but with the bill rather larger; and it is without the sooty brown on the wings." [Gray.]

A species with which I am only acquainted through the above cited very brief indication.

[NOTE.—Just as these sheets are leaving my hands for the printer's I learn through the kindness of my friend Dr. P. L. Sclater, of London, of the identification of the "Blue Mountain Duck" of Gosse's Birds of Jamaica. It appears in the Proceedings of the Zoological Society as *Pterodroma Carribæi*, Carte. I was surprised at learning that it is a "*Pterodroma*," as I had confidently anticipated that it would prove to be one of the *Prioneæ*; possibly however being prejudiced by the following note upon it by Richard Hill, Esq.† "From the dimensions of our bird, 13 inches long, by some 26 inches in the extent of wing, and from the proportions and character of the bill and nasal tubes, and the grooved mandible, I should say the *Blue mountain petrel* must be classed with the *Prion* of Lacépède, the genus *Pachyptila* of Illiger, the type being the *Procellaria vittata*, * * Our bird has a triple row of palatal teeth," etc.]

PAGODROMA Bonap.

Procellaria sp. Gmelin et Auctorum.
Thalassoica, sp. Reichenbach.
Pagodroma, Bonap. Consp. Av. 1855, ii. p. 192.—Type *Proc. nivea* Gmel.

The bill is very short, being less than half as long as the skull; and exceedingly small, weak, slender and compressed throughout, its base being much higher than broad. The lateral outlines are straight, rapidly converging to a narrow, elongated, rather slender, very convex, moderately decurved and hooked unguis, whose convexity begins immediately at the termination of the nasal case. The lateral sulcus is short, and very oblique. The outline of lower mandible is straight; of gonys a little concave, the angle of the sym-

* Description from specs. in the Philada. Acad. and Mus. Smithson.
† A week at Port-Royal. By Richard Hill. Montego Bay, 1855.

physis slight, the tip a little decurved. The interramal space is narrow, and densely feathered to the symphysis. The nasal tubes are exceedingly short, but broad, high, and turgid, the median line only obsoletely carinated. Their apex is very obliquely truncated, not at all emarginated. The orifice is large, and nearly circular; the internasal septum very thin, and not extending to the termination of the nasal case. The frontal feathers extend far on the base of the bill, running forward on the nasal case with a narrowly rounded termination, and sloping rapidly backwards and obliquely downwards. The outline of the base of the nasal tubes is thus rendered nearly as oblique as their apex.

The wings are rather short, when folded not reaching to the end of the tail. The second primary is not much shorter than the first. All the primaries are rather narrow, regularly tapering to their somewhat acute tips. The tertials and inner primaries are much abbreviated, making the distance in the folded wing, from their tips to the end of the first primary unusually great. The tail is very long, broad, and but slightly rounded, and is contained only about twice in the wing from the carpal joint. All the rectrices are broad to their very tips; which latter are squarely truncated.

The tarsus is as long as the middle toe; moderately stout and compressed; covered with small somewhat elongated irregularly shaped plates, which are rough and elevated, especially posteriorly, and are not notably different in size or shape on the two aspects of the tarsus. The tibiæ are feathered to very near the joint. The inner lateral toe with its claw barely reaches the base of the middle claw. The outer lateral toe is longer than the middle; its claw however so short, as hardly to reach to the tip of the middle claw. Claws are rather large, little curved, moderately compressed and acute; the inner edge of the middle one dilated. The hallux is unusually developed, and somewhat depressed in situation; long, stout, acute, and a little curved.

The size is moderate; the form compact and robust; the color entirely pure white.

This is one of the most remarkable generic types of the *Procellariinæ*. It is doubtless most nearly related to *Daption*, with which genus its "build" corresponds closely. But, as will be seen on comparing the diagnosis given, it differs in many details of structure, particularly those relating to the bill. From *Æstrelata* the pecularities of bill, of the hallux, comparative lengths of wings and tail, etc., readily distinguish it. The genus has a "physiognomy" or "facial aspect" that is peculiarly its own. The long depressed sloping forehead is found in no other *Procellaridian*. This is produced mainly by the flattening and elongation of the bones composing the forehead; but aided to a considerable degree by the great forward extension of the frontal feathers, which gives to the bill and nasal tubes their extreme brevity; causes such a long rictus; and places the eye, apparently, at so great a distance from the corneous base of the bill.

PAGODROMA NIVEA (Gm.) BOR.

Procellaria nivea, Gm., S. N. 1788, i. part ii. p. 562, and of authors generally.
Daption niveum, Stephens, Shaw's Gen. Zool. xiii. p. 243.
Thalassoica nivea, Reichenbach, tab. 22, fig. 791, 792.
Pagodroma nivea, Bonaparte, C. A. 1855, ii. p. 192.
Procellaria candida, Peale, Zool. U. S. Expl. Exped. 1848, p. 295.
Pagodroma, var. *major*, Bonaparte, l. c.
Pagodroma, var. *minor*, Bonaparte, l. c.
Procellaria nivea minor, Schlegel, Mon. *Proc.* Mus. Pays-Bas, 1863, p. 16.

Habitat.—Antarctic Ocean and Continent.

Independently of differences in absolute size of body, the species presents unending variations in size, and, to some degree, in shape, of the bill. Specimens differ in this respect by as much as a fourth of the whole length of the

bill, which may be quite unaccompanied by corresponding differences as to depth or width. The length of the nasal tubes, and the amount of turgidity, and obliquity of truncation vary greatly. Differences in the depth and robustness of bill are surprisingly great.

I have never seen, of many specimens, any which were separable specifically from the typical form. But some individuals are so strikingly small, that were it not for intermediate sizes, they might readily be supposed distinct. Upon this character a variety *minor* was founded by Bonaparte which has been adopted by so accurate and cautious an ornithologist as Dr. Schlegel.

The only synonym of note I have met with is *candidus* of Peale, (1848.) The original description of *P. nivea* by Gmelin speaks of black shafts of some of the feathers. As Mr. Cassin justly remarks (Orn. U. S. Ex. Exped. 1858, p. 416) should this ever be found to characterize a species, the present must bear Mr. Peale's name of *candida*. I think it probable that dark spots or streaks would be indicative of inmaturity; but being unfamiliar with the plumage of very young birds, I cannot speak with certainty.

DAPTION Stephens.

Procellaria sp. Linnæus, et Auct.

Daption, Stephens, Shaw's Gen. Zool. xiii. 1825, p. 239. Type *Procellaria capensis*, L.

The bill is much shorter than the skull, about three-fourths the tarsus, rather more than two-thirds the middle toe, very stout, depressed, about as broad as high for its whole length as far as the unguis, where it is suddenly much compressed and higher than broad. Culmen is about straight or a little concave from the nostrils to the root of the unguis, which latter is moderately large, but not very convex nor much decurved. The lateral outline of the bill is decidedly convex from its base to the unguis where the convexity suddenly ceases; it is produced by the large, inflated and protuberant lateral laminæ. Just inside the cutting edge of the bill is a series of oblique rugæ, extending the whole length of the bill. The lateral sulcus is well defined, running from the base of the nasal case to the unguis, obliquely downwards and forwards; it is most distinct posteriorly, more shallow anteriorly, where it merges into the depressed portion of the culmen. The lower mandible is perpendicularly narrow, but horizontally is unusually broad, the rami widely diverging from each other immediately from the symphysis. The gonys is short, scarcely convex in outline, its angle small and inconspicuous. The interramal space is very broad, in consequence of the wide divergence of the inferior mandibular rami, and their mutual concavity. The rictus is exceedingly ample; and the capacity of the fauces increased still more by the looseness and dilatability of the enclosed skin. The feathers on the side of the lower mandible extend but a short distance; those in the interramal space only as far as a point opposite the end of the nasal tubes; and by no means fill the space from side to side when the skin is at all distended.

The nasal case is very long for a component of the group *Æstrelateæ*, being a third as long as the culmen. It is broad, depressed, a little more elevated towards the apex, its dorsal outline a little concave and moderately carinated. The orifice is subcircular, nearly vertically truncated, a little emarginated.

The wings are of moderate length, about equal to the tail when they are folded. The second primary is nearly as long as the first; the rest rapidly graduated. The tail is rather short, contained about two and a half times in the wing from the carpus; is moderately and very evenly rounded; the rectrices being broad to their extreme tips. The upper tail coverts fall an inch short of the end of the tail; the inferior ones quite reach its extremity.

But a very brief portion of the tibia is naked of feathers. The tarsus is much shorter than the middle toe and claw, about equal to the inner toe; very stout, though much compressed; covered externally with very small, irregularly subcircular plates; which on the inner aspect are much larger and more regular

in shape; the median series of them so broad as to nearly stretch across the inner face of the tarsus. The inner toe is short, the tip of its small weak claw hardly reaching to the base of the middle claw. The outer toe without its claw is decidedly longer than the middle one; but the much greater size of the claw of the latter makes up the difference. The hallux is large and stout; a straight, almost perfectly conical, moderately acute, claw.

This genus is trenchantly separated from all others by the characters of the bill; in the lateral dilatation of which, the widely divaricating rami of the under mandible, and the partially naked and distensible skin of the interramal space, there is seen an approach to *Prion* of the *Procellariinæ*, and also to *Pelecanoides* of the *Halodrominæ*. The superior lateral mandibular laminæ are so wide and large, and so inflated, that they give a bulging convex lateral outline to the bill. In the same manner the inferior mandibular rami rapidly diverge from each other, their concavities presenting to the interramal space. In all these points there is an interesting resemblance to the genus *Pelecanoides*; further heightened by the broad ample rictus, loose dilatable skin of the floor of the mouth, which is only partially feathered. These peculiarities are not shared by any other genus of *Procellariinæ* except *Prion*; and leaving out of consideration the widely diverse nostrils, the bills of *Pelecanoides urinatrix* and *Daption capensis* are very similar in shape.

The genus is of moderate size, of robust and compact form, and variegated in the distribution of its colors. Its only known species is the type upon which it is based, the well known *D. capensis*.

DAPTION CAPENSIS (L.) Steph.

Procellaria capensis, Linn., S. N. 10th ed. 1758, p. 132. Linn. S. N. 12th ed. 1766, i. p. 213, No. 5. Linn. Amoen. Acad. iv. p. 240, and of other authors.
Daption capensis, Stephens, Shaw's Zool. 1825, xiii. p. 241: and of later authors.
Procellaria nævea. Brisson, Ornith. 1760, vi. p. 146, No. 3.
Procellaria punctata, Ellman, Zool. 1861, p. 7473. Cape Pigeon; Black and White Petrel; Petrel Tacheté; Pintado; Damier; Pardela, etc., Voyager's Vulgo.

This is one of the three species of *Procellaria* given by Linnæus in 1758. It has remarkably few synonyms, in consequence of its marked characteristics. Its features are so well known that no mention of them is necessary in this connection, as the peculiarities of its bill have been elucidated under the head of the genus.

Section *PRIONEÆ*.

The presence of laminated serrations along the inner edge of the upper mandible so trenchantly defines this group, that further characterization is unnecessary. A great similarity of color is found to prevail throughout.

After elimination of the genus *Halobæna* on the ground of its square tail and some other peculiarities, I find among the so-called Prions two very dissimilar types; which I consider as of generic import, and am therefore compelled, however reluctantly, to separate under a new designation.

The three genera here recognized may be thus distinguished:—

A. Bill compressed, its unguis large, its serrations moderate in extent, or confined to the base of the upper mandible.
   I. Tail truncated..... *Halobæna*.
   II. Tail graduated..... *Pseudoprion*.
B. Bill excessively dilated, depressed, its unguis small and weak; the serrations large and perfect to the extremity of the bill.
   III. Tail graduated..... *Prion*.

HALOBÆNA Is. Geoffr.

Procellaria sp. Gmelin, et auct.
Prion sp. Gray, Reichenbach, fide Bp.

Halobæna, "Is. Geoffr. 1836," Bon. C. A. 1855, ii. p. 193. (? Type *P. cærulea*, Gm.)

Chs. Bill provided with a few laminated serrations at the sides of the base of the upper mandible, just within the commissural edge of the upper mandible; in length slightly less than the tarsus, equal to the inner toe without its claw; slender, compressed throughout, a little higher than wide at the base. Superior lateral sulcus well marked, nearly straight; inferior shallow and indistinct. Unguis of upper mandible small, short, only moderately convex. Inferior unguis acute, much decurved, the gonys very concave, the ramal outline straight. Interramal space fully feathered. Nasal tubes only a fifth the length of the culmen, short, narrow, elevated, compressed, not carinated, terminally obliquely truncated; nares narrowly oval. Folded wings reach far beyond tail. Tail contained rather more than 2½ times in the wings from the carpal joint; square, with no graduation of the lateral feathers; all the rectrices so broadly rounded as to be nearly truncated. Tarsus equal to middle toe without claw; outer rather longer than the middle; but its claw so short as to make its total length rather less than that of the middle. Tip of inner claw just reaching base of middle.

The principal character which distinguishes this genus lies in the short, square tail; a feature which is quite unique in this family, being found in no other genus of the *Procellariidæ*. Its type and only known species is the old *cærulea* of Gmelin, a small delicately formed species, whose colors tend chiefly to bluish and white.

In general features of external form, proportions of tarsus and toes, and particularly the shape of the bill, which is much compressed, this genus is quite similar to *Æstrelata*, especially to such of its smaller species as *mollis* and *Cookii*. Nevertheless, the presence towards the base of the bill of distinct serrated laminæ, which constitute the essence of the *Prionitic* type,* indubitably fix its position among the latter group, to which also it so closely approximates in color. These laminæ only exist for a short distance on either side of the base of the bill; but still they are quite palpable and decided in character; perhaps as much so as in *Pseudoprion turtur* or *ariel*. The small and rather weak unguis, which does not begin to curve almost directly from the unguis, is essentially Prionitic, as distinguished from typical *Æstrelatines*. The bill though higher than broad in its whole length, is hardly more compressed than in *P. turtur*. From these considerations, and esteeming, as I believe justly, that the laminations are the essential character of the *Prioneæ*, and consequently more weighty than all others, I include the somewhat anomalous genus in this latter group. I regard it as the connecting link between the *Æstrelateæ*, on the one hand, through the genus Daption, and the *Prioneæ* on the other, towards the true type of which latter it approximates through the subtypical genus *Pseudoprion*.

I quote the reference to Isidore Geoffroy on the authority of Bonaparte, not having the means at hand of verifying the citation. I do not know what species is typical in the original founding of the genus. If it be the one named *Halobæna typica* in the Conspectus, then *Halobæna* is equivalent to, and has priority over my *Pseudoprion;* and a generic name is wanting for the *P. cærulea* of Gmelin.

HALOBÆNA CŒRULEA (Gm.) Bon.

Procellaria cærulea, Gmelin, S. N. i. ii. 1788, p. 560. Latham. Ind. Orn. 1790, ii. p. 827. Gould, Birds Aust. pl. 52, and of authors generally.
Halobæna cærulea, Bonaparte, C. A. 1855, ii. p. 193.

* In some genera not of the *Prioneæ*, e. g *Daption*, *Ossifraga*, etc., there are to be found along the inner border of the cutting edge of the upper mandible, a series of rugæ or alternate depressions and ridges, obliquely placed. These, however, are part of the mandible itself, and by no means distinct elements, and therefore are radically different in morphological character from the laminæ of the *Prioneæ*.

Pachyptila cærulea, Illiger, Prod. 1811, p. 275.—Steph. Shaw's Gen. Zool. 1825, xiii. p. 252.

Procellaria similis, "Forster's Drawings, No. 86." Forster, Descr. Anim. ed. Licht. 1844, p. 59.

Procellaria Forsteri, Smith, Ill. S. Afric. Birds, pl. 54. But not of Latham, which is *Prion vittatus*.

Habitat.—Antarctic Ocean. Australia.

Color. There is a short and not very conspicuous infra-ocular white line, and a superciliary streak of the same color; but not, however, running far down on the auriculars behind the eye. Above the bird is of a clear cinereous or grayish blue; extending as delicate clouding around the sides of the breast; and deepening on the head, most of the wing-coverts, the outer edges and tips of the four outer primaries, into brownish ash. It is chiefly the lesser wing coverts that are thus darkened; most of the greater ones being nearly as clear as the back. The secondaries and tertials are clear cinereous, edged and tipped with white; their inner webs being almost wholly of this color. The inner vanes of all the primaries, but particularly of the first four, are almost wholly pearly white except at their tips. The upper tail coverts are concolor with the back. The exterior pair of rectrices are white, with dark brown shafts; the next two are colored like the back; the rest similar except that a fuscous hue deadens the cinereous towards the end of the feathers, and their tips are squarely, trenchantly, and purely white; each for an increasing distance from without inwards. Forehead, cheeks, lower auriculars, under surface of wings and whole under parts of the body pure white.

Younger birds may be known by a less decidedly cinereous or bluish gray tinge of the upper parts; which tend more or less strongly towards brownish. The forehead is not pure white but mixed with about an equal amount of brownish ash. I have never seen specimens entirely fuscous or brownish cinereous below; but think it probable that such a state of plumage characterizes very young birds.

Dimensions. Chord of culmen 1·12; height of bill at base ·45; width slightly less. Tarsus 1·25; middle toe and claw 1·60; outer do. 1·50; inner do. 1 37. Tail 3·50; wing 8 to 9.

There is no other known Petrel with a square tail, conspicuously tipped with white. This peculiarity is mentioned in the various descriptions of the authors cited above in the list of synonyms, so that there is no difficulty in identifying their names. The *similis* of Forster* is said to have "rectrices 12 omnes apice candido-fasciatæ" which positively determines the species, although that author is in error in saying that it has the bill "non pectinatum."

PSEUDOPRION Coues.

Chs Lateral lamellæ of upper mandible normally developed, their surfaces vertical. Lateral outline of bill straight. Dorsal outline concave to the unguis. Unguis comparatively large, its chord forming more than a third of the total length of the culmen. Commissural edge of upper mandible not dilated. Inferior mandibular rami straight, divaricating at an acute angle; the lateral sulcus apparent. No groove for reception of fringe from upper mandible, which is either quite obsolete or imperfectly developed towards the end of the bill. Interramal space narrow, triangular, well feathered. Extension of feathers on side of lower mandible not further than those on culmen. Tail moderately graduated.

Type. *Prion turtur* Gould.

In amplification of the differences between the so-called *Prion Banksii*, *tur-*

* Concerning which Prof. Lichtenstein says very erroneously, "Species obscura, ulteriori examini relinquenda. A *Pr. vittata* (*Pachyptila*) non esse diversam nisi ætate suspicor."

tur, ariel and *? brevirostris*, and *Prion* proper, the following comparison is instituted.

The fringe of laminæ is smaller and weaker, and inflected inwards rather than descending vertically; and it is either restricted to a short space near the base of the bill (*turtur, ariel, ? brevirostris*) being quite obsolete more anteriorly; or if as in *Banksii* it extends to the unguis, it is small, weak and inconspicuous. The lateral lamellæ of the bill have scarcely more of development and inflation than in other genera of *Procellariinæ*, instead of being immensely hypertrophied; and they have a lateral, vertical aspect, instead of a superior nearly horizontal one. The commissural edge of the upper mandible looks downwards, with little inflation or reflection outwards, and nearly (though not quite except apically) touches the under mandible. There is no groove for the reception of the fringe of the upper mandible; but in its place the ordinary lateral sulcus of the sides of the lower mandible is apparent, though not very strongly marked. The inferior mandibular rami divaricate at an acute angle, and are quite straight, instead of widely diverging with a mutual concavity. The submental space, narrow and triangular instead of broadly conoidal, is quite fully feathered, instead of nearly naked; and doubtless has little of the distensibility which characterizes that of *Prion*. The extent of the feathers on the lower mandible is much more restricted. The unguis of the bill is larger, stronger, more convex, its tip more decurved, the chord of its convexity forming more instead of less than a third of the length of the culmen. The lateral outline of the bill is straight not convex. The tail is shorter than in Prion, being contained nearly twice in the wing; and it is less cuneiform. The nostrils and the proportions of the feet, are as in Prion; while the entire similarity, almost identity, of the coloration has doubtless had much to do with the referring of the species of this genus to Prion.

In the following antithetical table the main diagnostic points of the two genera are contrasted.

PSEUDOPRION.	*Differential Elements.*	PRION.
a. Poorly developed, or entirely obsolete towards end of bill.	a. *Fringe of serrations.*	*a.* Extensively and completely developed throughout.
b. Normal; vertical; not vaulted; nor with inflated free edge.	b. *Lateral lamellæ of bill.*	*b.* Hypertrophied; horizontal; arched; with inflated free edge.
c. Concave.	c. *Dorsal outline of culmen.*	*c.* Straight.
d. Of ordinary size, its chord more than a third of culmen.	d. *Unguis.*	*d.* Very small; its chord less than a third of culmen.
e. Straight.	e. *Lateral outline of bill.*	*e.* Convex.
f. Absent.	f. *Groove for reception of fringe.*	*f.* Present.
g. Apparent.	g. *Lateral groove on lower mandible.*	*g.* Wanting.
h. Nearly straight.	h. *Cutting edges of lower mandible.*	*h.* Very sinuate.
i. Narrowly triangular, well feathered.	i. *Interramal or submental space.*	*i.* Broadly conoidal, nearly naked.
k. Extend no further than those on culmen.	k. *Feathers on lower mandible.*	*k.* Extend much beyond those on culmen.
l. Moderately graduated, central feathers not protruding; contained nearly twice in the wing.	l. *Tail.*	*l.* Much graduated, central feathers elongated, contained one and a half times in the wing.

PSEUDOPRION BANKSII (Smith) Coues.

Pachyptila Banksii, A. Smith, Ill. S. Afric. Bds pl. 55.

Prion Banksii, Gould, Ann. Mag. N. H. 1844, xiii. p. 366. Gray, Gen. Birds, iii. 1849, p. 649. Bonaparte, C. A. 1855, ii. p. 193.

Procellaria Banksii, Schlegel, Mon. Proc. Mus. Pays-Bas, 1863, p. 17.

Habitat.—Antarctic regions, coming northward into temperate latitudes of both Hemispheres.

This species may be readily recognized by the continuation to the unguis of the fringe of laminæ, whereas in the others of the genus it is confined to a short space near the base of the bill. The laminations are, however, very small anteriorly; and are somewhat deflected inwards.

In colors the species of both *Pseudoprion* and *Prion* are so nearly identical that, compared with *Prion vittatus*, the present species seems to differ in hardly aught else than in the less amount of blackish towards the tail. On the middle feathers it is about an inch in depth; laterally decreasing so rapidly that there is hardly a trace of it on the three outermost. The bill and feet, however, are differently colored.

Dimensions. Bill (chord of culmen) a little more than one inch; width at widest point 0·50, height at base 0·44, at unguis about the same. Nasal tubes ·18. Tarsus 1·25. Middle toe and claw 1·50, outer do. about the same; inner do. 1 25. Wing 7 50 to 8·00. Tail 4·00; its graduation about ·75.

PSEUDOPRION TURTUR (Banks) Coues.

Procellaria turtur, "Banks icon. 15," and Solander's MSS. fide Bp. ? Kuhl, Mon. *Proc.* Beit. Zool. 1820, p. 143, No. 14, pl. xi. fig. 8. A. Smith, Ill. Zool. S. Afric. Bds. pl. 54. Gray, Genera Birds, 1849, iii. p. 648. Schlegel, Mon. *Proc.* Mus. Pays-Bas, 1863, p. 17.

Prion turtur, Gould, Ann. Mag. N. H. xiii. 1844, p. 366. Introd. B. Aust. p. 117, No. 602.—Id. B. Aust. vii. pl. 54. Bonaparte, C. A. 1856. ii. p. 193.

Habitat.—"Whole Pacific Ocean, between 30° and 50° of south latitude." (Gould.)

A species absolutely identical with *P. Banksii* in colors of plumage; but readily to be distinguished from that species by its somewhat smaller size, decidedly slenderer and more compressed bill, and especially by the restriction of the fringe of laminæ to the base of the bill, and their very incomplete development. The bill and feet are described as similarly colored with those of *Prion vittatus;* the webs flesh colored. The following measurements, particularly of the bill, taken from a specimen in the Philadelphia Academy, are to be compared with those of *Banksii* above given.

Chord of culmen 1·00; width of bill at base 0·33; height at base 0·37; at unguis the same. Nasal tubes 0·18; tarsus 1·15; middle toe and claw 1·45; outer do. 1·50; inner do. 1·25. Wing 7·25; tail 3·50; its graduation 0·50.

Authors agree in identifying the *Pr. turtur* of Banks' and Solander's inedits with the species beautifully figured by Mr. Gould under this name, and distinguished from *Banksii* by the characters given in the preceding p ragraphs.

Following the *P. turtur* in Bonaparte's Conspectus is given a "*Pr. Rossi*, Gr. Mus. Britann. ex Mar. antarcticis. Similis *Prioni turturi;* sed minor, et proportionibus diversis; rostro latiore." I do not know what this can be; unless, as is quite probable, it indicates the *Prion ariel*, Gould.

PSEUDOPRION ARIEL (Gould) Coues.

? *Procellaria turtur*, Kuhl, Mon. *Proc.* Beit. Zool. 1820, p. 143, pl. xi. fig. 8. (Also of Lesson, according to Bonaparte.)

? *Procellaria velox*, Banks, ic. ined. No. 16, fide Bp.

Prion ariel, Gould, "Proc. Zool. Soc." Ann. Mag. N. H. 1844, xiii. p. 366 — Introd. B. Aust. p. 117, sp. 605.

Procellaria ariel, Schlegel, Mon. Proc. Mus. Pays-Bas, 1863, p. 18.
Halobæna typica, Bp. C. A. 1856, ii. p. 194.

Habitat.—Australian Seas.

I have not been able to find where this species is originally described by Mr. Gould, if it has been at all more than named by him. From Dr. Schlegel's description* of typical specimens received by him from Mr. Gould, it appears to have exactly the colors, and the development of the laminæ of the bill which obtain in *P. turtur*; and to be distinguished from that species by its smaller size; and a very slender bill, wider than high at the base.

Synonymy. It is a little uncertain to which species the *P. turtur* of Kuhl's Monograph, No. 14, fig. 8, really refers The figure of the bill agrees quite nearly with a specimen of the *turtur* Gould, of the preceding article of this paper; but the description given by Dr Kuhl, and especially the measurements rather seem to indicate the present species, *ariel*, Gould. But Dr. Kuhl also gives the measurements "Avis aliquantum major," which rather are those of the true *turtur*. There are cited Bank's *turtur*, pl. 15, and also *Pr. velox* Banks, pl. 16 as synonyms; the first of which (according to most authors) representing the *turtur* of Mr. Gould, and of this paper; the second indicating the true *ariel* of Gould. Under the circumstances, it is evident that Kuhl's *turtur* may be, without violence, referred to either of the two species; and authors are about equally divided in opinion regarding it.

Bonaparte's Conspectus does not admit *ariel* as a valid species; but has instead a certain *Halobæna typica* Bp. based upon a specimen in the Paris Museum. He cites "*turtur*" Lesson, Kuhl, fig. 8, and "*velox?*" Banks, pl. 16, as synonyms; and his diagnosis presents no points forbidding the reference of this *H. typica* to the *Prion ariel* of Gould, with which Dr. Schlegel considers it as synonymous.

? Pseudoprion brevirostris (Gould).

Prion brevirostris, Gould, P. Z. S., 1855, p. 88, pl. 93.

"Upper surface delicate blue; edge of the shoulder, the scapularies, outer margins of the external primaries, and tips of the middle tail feathers black; lores, sides of the head and all the under surface white, stained with blue on the flanks and under tail coverts; bill light blue, deepening into black on the sides of the mandible and at the tip, and with a black line along the side of the under mandible; feet light blue; interdigital membranes flesh color.

Length 10½ inches; bill $\frac{15}{16}$; wing 6§; tail 2½; tarsi 1¼."

I am only acquainted with this supposed species by the plate and description of Mr. Gould, above cited, and can offer no opinion regarding it. The description does not indicate any tangible points of difference from *P. ariel*. By Gray, and, I believe, also by the majority of writers, it is considered as a synonym of *P. ariel*.

PRION Lacépède.

Procellaria sp. Auct.
Prion, Lacépède, Mem. de l'Inst., 1800—1801, p. 514. (Gray).
Pachyptila, Illiger, Prod., 1811, p. 274, No. 132.
Priamphus, Rafinesque, 1815, fide Bp.

The essential characters of this genus lie in the peculiar shape of the bill and the complete development of the serrated laminæ, which are the distinguishing features of the group of which it is typical. The modifications to which the bill is subjected produce a result which, compared with other *Procellaridæ*, may be likened to that seen in the genus *Cancroma* among the

* Schlegel l. c. "Semblable à la *Procellaria turtur*, également par rapport aux lamelles des mandibules; mais de taille moins forte, et à bec plus faible. Aile 6 pouces 2 lignes; pointe de l'aile 2 pouce 3 lignes. Queue; pennes mitoyennes 2 pouces et 8 à 10 lignes; pennes externes 2 pouces et 5 à 7 lignes. Bec: longueur 9 à 10 lignes; hauteur 2 lignes et demie; largeur 3 lignes et demie à 4 lignes. Tube nasal, 2 lignes. Tarse 12 a 13 lignes. Doigt du milieu 12 a 13 lignes. Individus de Mers de l'Australie obtenus en 1863 de Mr. Gould."

Ardeidæ. I have not met with as detailed a description of its peculiarities as seems desirable.

The culmen, from the extremity of the nasal case to the root of the unguis, is quite straight. Though rising up as a conspicuous ridge between the deep longitudinal sulci on either side, its outline is broad, flat, depressed, and not carinated. The unguis of the upper mandible is small and weak, and hardly rises above the level of the culmen proper; its convexity and decurvation are slight.

On either side of the culmen, from the root of the nasal case to the junction of the lateral mandibular lamellæ with the unguis, lies a well-marked, deep longitudinal sulcus; the central line of which depression, from the end of the nostrils to the unguis, is occupied by a distinctly defined ridge.

The immensely-developed lateral lamellæ of the superior mandible have so great a lateral extension, as to make the width of the bill at its broadest part nearly two-thirds its length. These lamellæ are arched and inflated throughout; and their surface is superior, not lateral. The free commissural edge is convex in outline; retreating slightly inwards and backwards from the broadest point of the bill, which is a little in advance of its extreme base; converging more rapidly and nearly in a straight line thence to the unguis; it is dilated and bulging posteriorly where it overhangs, but by no means meets or touches, the inferior mandibular rami; more anteriorly, it is deflected downwards, and terminally rests against the unguis of the lower mandible.

From the under surface of the lateral lamella near its free edge grow a series of serrated laminæ, which extend from the very angle of the mouth to the unguis; their outline corresponding nearly to that of the edge of the lamella whence they spring. They are directed downwards, with a little outward and forward inclination. They are longest, largest, and their "set" is most oblique at the broadest point of the bill; whence, as they proceed either forwards or backwards, they diminish in size and become more vertical in direction. It is this fringe of serrations that is in apposition with the under jaw; forming, therefore, the true commissural edge of the upper mandible. These laminæ are, so to speak, a series of plates, antero-posteriorly thin, elastic and yielding; transversely wide and resisting; whence it results that they can readily be bent away from each other; but the series cannot be laterally deflected, as a whole; exactly as is the case with the teeth of a comb.

The nasal tubes are very short, measuring hardly more than a fifth the length of the culmen and unguis; broad and depressed; placed conspicuously high upon the base of the culmen. They are somewhat more elevated apically than basally; their apex is so deeply emarginate as to cause a partial segregation of the two tubes towards their termination. The orifice of each naris is circular; the internasal septum rather wide.

Corresponding with the general shape of the upper, the lower mandible is very broad; its rami widely divaricating, presenting much concavity towards each other. Its cutting edge is very sharp and strongly sinuate for its whole length, being curved in several planes oblique to each other. From the widest point, which is opposite the extremity of the feathers on its side, the rami rapidly converge to the unguis; which latter is very small and weak, its gonys very concave in outline, its tip acute and much decurved. There is hardly an eminentia symphysis.

The true lateral sulcus of the rami seen in most *Procellariinæ*, is wanting. In its place we have, just external to the true cutting edge of the lower mandible, a groove which extends the whole length of the ramus; deepest and most marked posteriorly; apically becoming obsolete. This groove, owing to the inflection of the edge of the mandibular ramus, looks upwards and outwards, and into it the fringe of laminæ are received. More anteriorly where the groove is obsolete, the teeth simply abut against the side of the under mandible.

The broad space between the widely-separated, mutually concave inferior mandibular rami is occupied by soft, more or less distensible skin, naked of feathers, except a small triangular wedge which extends forwards from the base only to a point but a little in advance of the termination of the feathers on the side of the lower mandible. Even this patch does not fill the space from side to side. The feathers on the side of the lower mandible extend as far as the broadest point of the bill. The frontal feathers project a little on the nasal case. Retreating somewhat, they then stretch transversely across the base of the lateral lamellæ, with no obliquity backwards, to the very edge of the bill; which is thence densely feathered to the angula oris.

Bill about as long as the tarsus; the latter equal to middle toe without its claw; covered with quite regular hexagonal plates, largest antero-interiorly. Outer toe and claw about equal to middle. Tip of inner reaching base of middle. Hallux strong, straight, conical, placed rather low down. Folded wings not surpassing tail. First and second primaries about equal; last successively more rapidly graduated. Tail long; two-thirds the wing from the carpus, or contained one and a half times in it; cuneate; central rectrices acuminately rounded and somewhat projecting; lateral ones more broadly rounded and much graduated in length.

PRION VITTATUS (Gm.) Lacép.

Procellaria vittata, Gmelin, S. N. i. pars ii. 1788, p. 560, and of authors.
Prion vittatus, Lacépède, Gray, Gen. Birds, 1849, iii. p. 649, and of later authors.
Pachyptila vittata, Illiger, Prod., 1811, p. 275.
Procellaria Forsteri, Latham, Ind. Orn. ii. 1790, p. 827. Not of Smith.
Pachyptila Forsteri, Swainson. Class. Birds, ii. p. 374. Lesson, Traité, 1831, p. 613. Jard. and Selb. Illust. Orn. pl. 47. Steph. Gen. Zool. xiii. 1825, p. 251.
Procellaria latirostris, Bonnærté, Ency. Metod.

Habitat.—Southern portions of both Atlantic and Pacific.

Line over the eye white. A transocular dusky fascia. Entire upper parts light grayish or plumbeous blue; which color, somewhat diluted, clouds the sides of the breast and the flanks. Edge of wing, lesser coverts, outer vanes and tips of four first primaries, and terminal area on tertials, blackish plumbeous. Inner vanes of quill feathers and tips of tertials fading into pearly or grayish white. Tail concolor with back; passing terminally into plumbeous black; which, from an extent of 1½ inches on the central rectrices, decreases successively to a bare trace on the outer ones. Under tail coverts white, somewhat clouded with plumbeous. All other parts are pure white. "Bill light blue, deepening into black on the sides of the nostrils and at the tip, and with a black line along the sides of the under mandible; irides very dark brown; feet beautiful light blue." [Gould.]

Dr. Kuhl's fig. 13, and M. Temminck's Pl. Col. 528, are by Dr. Schlegel supposed to refer to the *P. Banksii* rather than to this species, contrary to the opinion entertained by most ornithologists. The former figure measures eleven-sixteenths of an inch in width at the widest part of the bill; a dimension which the *Banksii* is hardly known to attain.

In accordance with the views entertained in the preceding pages, the following synopsis of the genera and species of the two sections treated of is prepared.

Family *PROCELLARIIDÆ.*

Subfamily PROCELLARIINÆ.

Section *Æstrelateæ* (Bp. 1855).

The cutting edge of the upper mandible is not dilated nor furnished with serrations.

Genus I. ÆSTRELATA Bp., 1855 Bill robust, compressed, its unguis large, hooked from the nostrils. Interramal space narrow, fully feathered. Extension of feathers on forehead moderate. Nasal case short. Tail more or less cuneiform, the lateral rectrices much graduated. Hallux of ordinary size.

1. A. HÆSITATA Coues, ex *Proc. hæsitata* Kuhl. Not of Forst., Reich., Gld. nor *Puff hæsit.* Lawr. *Proc. brevirostris* and *meridionalis* Lawr., or *Fulmarus merid.* Bp., but not *brevirostris* Less. *Puffinus l'Herminieri* Less. *Æstrelata diabolica* Bp. Large; pileum and upper parts brown; upper tail coverts, basal half of tail, forehead and neck all around white. Bill or tarsus 1·45; wing 12·00; tail 5·50; middle toe and claw 2·12.

2. A. LESSONI Cassin, ex *Proc. Lessoni* Garnot. *Rhantistes Lessoni* Bp. *Proc. leucocephala* Forst. *Æstrelata leuco.* Bp. *?Pr. alba* Gm. *?Daption album* Steph. *Pr. variegata* Bonn. *Pr. vagabunda* Sol. secundum Bp. Large; head all around white, except a transocular fascia. Back deep ash. Tail and coverts ashy gray. Bill 1·50; tarsus 1·65; middle toe and claw 2·50.

3. A. ROSTRATA Gray, ex *Pr. rostrata* Peale. *Rhantistes rost.* Bp. Large, bill excessively robust, along chord of culmen 1·37; height or width at base 0 66. Wing 11·00, tail 4·75. Tarsus 1·75. With the pattern of coloration and nearly the tints of young *Lessoni.* Frontal feathers running far forward on the nasal case.

4. A. PARVIROSTRIS Coues, ex *Pr. parvirostris* Peale *Rhantistes parvir.* Bp. Medium, bill slender and compressed, its length 1·08. Tarsus 1·25. Outer toe and claw 1·66. Young? Above deep fuliginous brown, (no trace of ashy,) this color extending all around the head and neck, on the tips of the feathers.

5. A. INCERTA Coues, ex *Pr. incerta* Schlegel.—Large. Wing 11·50; tail nearly 5, much graduated. Bill 16 to 17 lines; height 5 lines. Tarsus 1 50. Colors as described much those of young *Lessoni;* to which the species may be referrible.

6. A. NEGLECTA Coues, ex *Pr. neglecta* Schlegel.—Medium, with the colors of *incerta.* Bill; length 1·12; height 4 to 5 lines. Wing 10·00 inches. Perhaps to be referred to *parvirostris.*

7. A. SOLANDRI Coues, ex *Proc. solandri* Gould.—*Cookilaria solandri* Bp.—*Pr. melanopus* Natt. nec. Gm.—Large; very robust. Length 16; bill 1·75; wing 12; tarsus 75; tail 5·50; middle toe and claw 2·37. Bill and feet black. Above dark brown; becoming slate gray on middle of back, and wing and tail coverts. Young? Washed with gray on the abdomen.

8. A. GRISEA Coues, ex *Pr. grisea* Kuhl, according to Schlegel's identification.—*Pr. lugens* Banks, Forst. ined. *Æst. inexpectata* Bp. nec. Forst. Medium, generally like *mollis;* with a more compressed bill, and some discrepancies in dimensions. Wing 9·50; tail 3·88; bill 11½ lines; tarsus 16½ lines; middle toe 19 lines.

9. A. MOLLIS Coues, ex *Pr. mollis* Gould.—*Cookilaria* and *Rhantistes mollis* Bp.—*Pr. inexpectata* Forst.—*? Pr. melanopus* Gm. Vieill. Steph.—*? Pr. gularis* Peale.—*? Pr. Philippii* Gray.—*? Pr. crepidata* vel *sandaliata* Sol. according to Bp. Medium, bill (chord of culmen) 1·10; height at base ·45; width slightly less; tarsus 1 33; outer toe and claw 1·75; wing ranging from 9·50 to 10·50; tail 4·50. Under surfaces of the wings concolor with the upper.

10. A. COOKII Coues, ex *Pr. Cookii* Gray.—*Rhantistes Cookii* Bp.—*Pr. leucoptera* Gld. *Cookilaria leucoptera* and *C. velox, Rhantistes velox* Bp. *Pr. brevipes* Peale. Small. Bill 1·00, height at base ·35. Wing 8·50 to 9·00; tail 3·75 to 4·25, its lateral graduation 1·00 to 1·50. Tarsus 1 10. Under wing coverts and a line along edge of fore arm white.

[May,

11. A. GAVIA Coues, ex *Pr. gavia* Forst. (following G. R. Gray's authority.) Small; with the colors generally those of *Cookii*, including under wing coverts. "Expanse 26; bill 1·50; tibiæ 1·75; tail 2·50," [Forst.]

12. A. DESOLATA Bp. ex *Pr. desolata* Gm.—*Daption desolatum* Steph. Smallest. With the general colors of *Cookii*. Wing 7·80; tail 3 40, its graduation ·75. Bill less than one inch. Tarsus or middle toe about 1·00.

13. A. MACROPTERA Coues, ex *Pr. macroptera* Smith.—*Ossifraga macroptera* Reich.—*Pterodroma mac.* Bp.—*Pr. brevirostris* Less. nec. Lawr.—? *Pr. lugubris* Tsch. Large; wings long; face gray; tarsi yellow.

14. A. FULIGINOSA Coues, ex *Pr. fuliginosa* Kuhl, sp. 12, (not *fulig.* Kuhl, sp. 27; not of Gm. Lath.; not *Puff. fulig.* Strickl. not *Nectris fulig.* Forst.)—*Pr. atlantica* Gld. *Pterodroma atl.* Bp. Large. Everywhere fuliginous; feet dark colored. Bill 1·35. Tarsus 1·60; middle toe and claw 2·20; wing 10·75 to 11·50; tail 4·50 to 5·00.

15. A. ATERRIMA Coues, ex *Proc. aterrima* Verr.—*Pterodroma aterr.* Bp. Small. Tarsi light colored, passing into black upon the terminal portion of the toes. Wing 8·50; tail 3·50; bill slightly more than an inch. Tarsus 1·33.

16. A. BULWERI Coues, ex *Pr. Bulweri* Jard. and Selby. *Thalassid. Bulweri* Gray.—*Pr. anjinho* Heineken.—*Puffinus columbinus* Webb and Berth.—*Bulweria columbina* Bp. Smallest. Proportionate length of tail to wing as 4·50 to 8; graduation of tail 1·75 to 2·00. Bill ·85; tarsus a little longer.

17. A. MACGILLIVRAYI Coues, ex *Thalassidroma* (*Bulweria*) *macgillivrayi* G. R. Gray. Like *Bulweri;* bill larger; no sooty brown on wings.

18. A. CARIBÆI Coues, ex *Pterodroma carribæi* Carte. "Blue Mountain Duck," Gosse.

Genus II. PAGODROMA Bp. 1855. Bill very short, moderately strong and compressed. Forehead flattened; and lengthened by the extension forward of the feathers. Interramal space narrow, densely feathered. Nasal tubes short. Hallux unusually developed. Tail long, broad, but slightly rounded.

19. P. NIVEA Bp. ex *Pr. nivea* Gm.—*Daption n.* Steph. *Thalassoica n.* Reich.—*Proc. candida* Peale. *Pagodroma* var. *major* Bp. Entirely white. Subject to great variations in size; forming var. *minor* Bp.

Genus III. DAPTION Steph. 1825.—Bill much dilated, unguis small and weak. Interramal space wide and partially naked, oblique sulci on inner face of cutting edge of mandible. Nasal tubes long. Hallux of ordinary size. Tail rather short, moderately rounded.

20. D. CAPENSIS Steph. ex *Pr. capensis* Linn.—*Pr. nævia* Briss.—*Pr. punctata* Ellm. Spotted with black and white on upper parts.

Section *PRIONEÆ* (Bp. 1855.)

The upper mandible is furnished near its edge with laminated serrations.

Genus I. HALOBÆNA Is. Geoff. External form of bill much that of *Æstrelata;* serrations few and inconspicuous. Tail truncated.

1. H. CÆRULEA Bp. ex *Pr. cærulea* Gm. *Pachyptila cærulea* Ill. Steph. *Pr. similis* Forst. *Pr. Forsteri* Smith, nec. Lath. Tail tipped with white.

Genus II. PSEUDOPRION Coues. Serrations poorly developed or quite obsolete towards end of bill. Lateral lamellæ of bill normal, their free edges uninflated. Culmen concave; lateral outline of bill straight. Interramal space narrow, well feathered. No sulcus for reception of fringe. Tail moderately long and rounded, contained nearly twice in the wing.

2. Ps. BANKSII Coues, ex *Pachyptila Banksii* Smith.—*Prion B.* Gld. *Procellaria B.* Schl. The fringe of serrations is apparent to the end of the bill. Chord of culmen 1·05; width of bill at widest point ·50; height at base ·44.

3 Ps. TURTUR Coues, ex *Proc. turtur* Banks "icon. ined. No. 15."—Also of Kuhl? *Prion turtur* Gld. The fringe of serrations is confined to the basal portion of the bill. Chord of culmen 1·00; height of bill at base ·37; width ·33.

4. Ps. ARIEL Coues, ex *Prion ariel* Gould.—*? Proc. turtur* Kuhl.—*Proc. ariel* Schl. *Halobæna typica* Bp.—*? Prion brevirostris* Gld. Smaller than *turtur*. Bill 9 to 10 lines, height 2½ lines; width 3½ to 4 lines.

Genus III. PRION Lacép. 1800—1. Serrations developed to the maximum. Lateral lamellæ hypertrophied, with inflated free edges. Culmen straight; lateral outline of bill convex to the unguis. A deep sulcus on either side of the culmen; another on the lower mandible for reception of the fringe. Interramal space broad, nearly naked. Tail elongated, much graduated, contained 1½ times in the wing.

5. PR. VITTATUS Lacép. ex *Proc. vittata* Gm. *Pachyptila vitt.* Ill. *Proc. Forsteri* Lath. nec. Smith. *Pachypt. Forsteri* Swains. *Proc. latirostris* Bonn. Greatest width of bill three-fourths of an inch or more.

In a subsequent paper will be considered the *Diomedeinæ* and *Halodrominæ*.

Critical Review of the Family PROCELLARIIDÆ;—Part V; embracing the DIOMEDEINÆ and the HALODROMINÆ. With a General Supplement.

BY ELLIOTT COUES, M. D., U. S. A.

The group composed of the Albatrosses is so trenchantly distinguished from all other *Natatores*, that for its definite characterization it is only necessary to advert to the absence of the hallux, and to the position of the rhinothecæ. In other morphological points the Albatrosses conform closely to the type of structure which obtains throughout the *Procellariinæ*.

The Halodromes, if really components of the family *Procellariidæ*, are the most curiously aberrant of all the *Gaviæ* or Longipennine Natatores. They appear to hold a quite anomalous position, intermediate between several natatorial suborders. The very short falcate wings, no less than the absence of the hallux; the general configuration of the body, and especially the position of the posterior extremities relative to the axis of the body; as well as the compactly imbricated, glossy plumage; indicate a close affinity with the *Urinatores*, or Brachypterous Natatores. These structural resemblances are borne out by the attitudes, habits, and mode of life of the species, so far as we are acquainted with them; which are rather those of Guillemots than of Petrels. The dilation of the bill particularly of the under mandible, and the partially naked and distensible submental skin, which forms an imperfect pouch, point to a type of structure extensively prevailing among the *Totipalmi*. Most of the latter have the rhynchotheca segmented; so that almost the only character of the Halodromes which is strictly Procellaridian is the tubulation of the rhinotheca; and even in this feature the details of shape and direction of axis are entirely unique. So far indeed as external characters are concerned, arguments are adducible for their reference to either of the three tribes above alluded to; and especially to the *Urinatores*. It remains for the scalpel to finally determine their true affinities.

By Illiger* the tubulation of the rhinotheca has been made indicative of a tribe (although called a family) *Tubinares*, which is attaching to it a value coördinate with such a character as *e. g.* the membranous union of the hallux

* Prodromus, 1811, p. 274.

with the inner anterior digit, which defines what we now recognize as the tribe or rather suborder *Totipalmi*, embracing numerous families. Proceeding upon this basis we should be obliged in like manner to form a tribe or suborder "Linearinares" of what is now known as the family *Laridæ*, and erect its four recognized subfamilies into as many families.

By Bonaparte* the order Gaviæ is made to consist of two tribes, the *Totipalmi* and the *Longipennæ;* the latter containing two families,—*Laridæ* and *Procellariidæ*—the differences between which essentially rest in the linear or tubular form of the nostrils; for continuity or division of the corneous rostral envelope does not always point to one or the other family, as the *Lestridinæ* of the *Laridæ* have somewhat the features of the *Procellariidæ* in this respect. In this arrangement an essentially brachypterous bird,—one truly a "diver" rather than a "flyer" in the sense in which these words are technically apposed—is classed among the Longipennines.

If a tubular rhinotheca be really the most essential feature, and at the same time of no more than family value, then its modifications may with propriety be held as indicative of three subfamilies *Diomedeinæ*, *Procellariinæ*, and *Halodrominæ*. But it is questionable whether such be indeed the case. An approach to this feature is seen in the *Lestridinæ*, (of a family otherwise exhibiting strictly linear basal nostrils, and an undivided rhynchotheca;) in which the so-called "cere" is really a segmentation of the corneous envelope and probably also indicative of tubulation of the nares. It is by no means proven that the peculiar nostrils of the *Procellariidæ* as generally defined, should not be held as subsidiary in importance to, or at least of no more than coördinate value with, other points of structure. Upon such an hypothesis the birds now called *Procellariidæ* would be divisible into three families, somewhat according to the following schedule:—

I. Tridactyle.

A. Macropterous; "flyers;" the tubular nostrils disjoined, lateral, horizontal..... *Diomedeidæ.*

B. Brachypterous; "divers;" the tubular nostrils united, culminal, vertical..... *Halodromidæ.*

II. Tetradactyle.

Macropterous; "flyers;" the tubular nostrils united, culminal, horizontal..... *Procellariidæ.*

But this arrangement is as faulty as the others, in the presence of an incongruous brachypterous element; and we should moreover be obliged to recognize a tribe or suborder for the three families thus collocated.

It will be evident, therefore, that so long as we regard a tubular rhinotheca as a primary fundamental character, not permitting of a wide separation of the forms in which it is present, we shall bring into juxtaposition certain types widely dissimilar from each other in most other respects; and that we do not obviate the difficulty when we make this character indicative of a suborder, under which several families may be ranged, any more than in considering it as of family importance, and forming our subfamilies upon its modifications. In either case we are met by the same objection. It remains to be proven that tubulation of the external nares is not a feature of subordinate importance to others, and as such, one which may coëxist in types otherwise presenting a widely diverse assemblage of characters. In which event, at least one genus now held as Procellaridian will be found to constitute a family of quite a different suborder; and certain others will form at least a family distinct from that of the Petrels proper. The test of anatomical investigation must be applied before the question can be definitely settled; for in one sense external characters of every sort are but the indices, as it were, of fundamental struc-

* Schema Systematis Ornithologiæ, C. rapt. Rend. xxxvii. 1853.

tural modifications; and as such unavailable for the truly scientific definition of groups of a higher grade than families.

In calling attention to the foregoing considerations, I wish to be understood as offering no opinion upon the questions involved, and particularly as by no means asserting that the Halodromes are not true Procellaridians. It is rarely of use to exchange one doubtful opinion for another; and for the present I shall follow the usually received classification. But it is safe to affirm that by the determination of the proper affinities of these birds the exact value of the character of tubulation of the rhinotheca is to be ascertained.

Subfamily *DIOMEDEINÆ*.

In a careful study of the Albatrosses, the interesting fact becomes evident, that we have an easy and convenient means of accurate diagnosis of species in the characters afforded us by the bill alone. All the known species differ from each other by perfectly tangible and readily appreciable variations in the size, shape and color of the bill; in the configuration of its several corneous elements, and in the outline of the feathers around its base. This latter feature, conjointly with the shape of the corneous covering of the culmen in that portion of its extent which is posterior to the nares, gives us such reliable data that we need hardly enquire further. I shall, therefore, in the following pages confine myself chiefly to detailed descriptions of the bill; and it will be noticed, as supporting the foregoing assertions, that a synoptical table may be drawn up solely upon the characters mentioned above.

As we shall study the bill somewhat in detail, I introduce, for convenience of description, several words expressive of the different corneous elements which cover it; the meaning of which will be obvious. I may remark that the piece interposed between the inferior mandibular rami at the lower border of their symphysis (here called the "interramicorn,") is a feature which also definitely characterizes this group, as it is present in no other. The presence of a well defined membranous fringe on the exterior toes is also highly characteristic.

In the following pages I describe eleven species—one of them supposed to be new—and indicate the possible existence of a twelfth. Of these one differs so much from the rest that it may be properly made the type of a genus distinct from *Diomedea*. The remaining species have also been subdivided into several genera, chiefly by Prof. Reichenbach. Such a collocation of species is certainly natural, regarded as simply expressive of the fact that certain of them are more intimately allied to each other, than they are to the species of another group; but the differences presented seem hardly sufficient to warrant our attaching generic import to them. The following will serve to explain the point alluded to.

Group A. Comprising *exulans*, *brachyura*, *nigripes*, *gibbosa*. Of largest and medium size. The bill is very broad, stout and heavy; and especially very wide at its base, and is uniform in color. The colors of the plumage are white, variegated with black, especially upon the wings; or uniform fuliginous. The tail is very short. The nostrils are large, and wide. *Exulans* may be considered as typical of this group. The length of tail reaches its minimum in *brachyura*, upon which character Prof. Reichenbach founds his genus *Phœbastria*.

Group B. Comprising *melanophrys*, *Gilliana*, n. sp. *cauta*, *culminata*, *chlororhyncha*, *olivaceirostris*. Of medium and rather small size. Bill shorter, weaker, and considerably compressed, usually bright or parti-colored. White, with black back and wings. Tail long, slightly rounded. *Melanophrys* may be taken as the type of this group, which constitutes the genus *Thalassarche* Reich. Both *melanophrys* and *Gilliana* differ from the other three species in the character of the culminicorn, as will be hereafter more particularly elucidated.

So varying are the characters of shape of bill, outline of frontal feathers, length of tail, etc., that I think they can hardly be made typical of distinct

genera. *D. fuliginosa* itself would be hardly separable were it not for the presence of some features radically distinct from, and not merely a modification or varying combination of those presented by *Diomedea* proper.

DIOMEDEA Linnæus.

Diomedea, Linnæus, S. N. 1758, and of authors. Type *D. exulans*.
Phœbastria, Reichenbach, Syst. Av. Type *D. brachyura* Temm.
Thalassarche, Reichenbach, Syst. Av. Type *D. melanophrys* Boie.

Under this head I shall consider all the species of Albatross except *D. fuliginosa*. Its general characters have already been sufficiently elucidated. The points of difference between it and *Phœbetria* will be found in the synoptical table at the end of this article.

DIOMEDEA EXULANS Linnæus.

Diomedea exulans, Linn. S. N. i. 1766, p. 214; and of authors. Pl. Enlum. No. 237.—Vieill. Gal. pl. 295.—Gould, B. Aust. pl. 38, etc.
Diomedea spadicea, Gmel. S. N. i. pt. ii. 1788, p. 568.—Lath. Syn. v. 1785, p. 308, No. 2.—Lath Ind. Orn. ii. 1790, p. 790.—Lath. Gen. Hist. 1824, x. p. 52. No. 2; (excl. Var. B.) Banks ic. ined. t. 25, fide Gray. *Young.*
Diomedea albatrus, Pallas, Zoog. Rosso-As. ii. 1811, p. . Forster, Desc. Anim. ed. Licht. 1844, p. 27.
? *Diomedea adusta*, Tschudi, Cab. Journ. f. Ornith. 1856, p. 157, sp. 7.

Habitat.—Southern Hemisphere at large; ranging to a considerable distance north in the Pacific.

The great size of this species renders it easy of recognition in any of its very diverse plumages. I will confine myself to a description of the bill, the general features of which may be taken as the standard of reference for all the species of the subfamily.

The frontal feathers form a rather obtuse angle on the forehead, whence they run forward on the side of the upper mandible to a point a little posterior to the root of the nostrils; whence, with a slight backward obliquity, they extend to the commissure. On the side of the lower mandible they come forward far beyond those on the upper, and have a very convex—almost angular—outline. This latter feature is constant, and of great value in distinguishing small *exulans* from large *brachyura* when both are in fuliginous plumage. (Compare outline as described under *brachyura*.) The point of greatest extension is nearly opposite the middle of the nostrils. The frontal feathers form a more reëntrant concavity on the forehead, and a more salient convexity on the side of the lower mandible, than in any other species except *fuliginosa*.

By gentle maceration in warm water, into which a little potassa or soda has been thrown, the various corneous elements of the bill readily separate from it and from each other, so that we can advantageously study them.

The "culminicorn" is transversely broad and rounded, but may be somewhat compressed or even a little carinated; a great difference in these respects being observable in a large series of bills. Its dorsal outline descends in a nearly straight line from the base to the middle of the bill; whence it more rapidly rises with much concavity to the base of the unguis. Its inferior border is curved with a convex border from its distal extremity to the nostrils; then a considerable concavity is formed by the cutting away of a space for the emergence of the nostrils. Behind these, it again dips down with a salient convexity to join the upper edge of the latericorn; their union, however, being rather a point than a line. The outline of the base corresponds with that of the frontal feathers above given; and there are usually found a few corrugations parallel with this outline. The distal extremity is more or less fused with the superior unguicorn or dertrotheca, especially on the median line of the culmen.

The "latericorn" corresponds in its superficies with the shape of the mandi-

bular ramus of the intermaxillary. Its superior border is nearly straight for its whole length; no emargination existing opposite the nostrils, nor hardly any decurvation in its terminal portion. A corneous ridge, incompletely fused with it, separates its true superior border from the inferior border of the culminicorn—occupying the length of the sulcus from the nostrils to its termination. Its inferior border is sharp and regularly curved in outline for its whole length. Internal to the commissural edge, it extends as an exceedingly delicate, thin lamina to line the roof of the mouth, fusing, anterior to the palatal fissure, with its fellow of the other side; more posteriorly distinct, and descending to cover the large swollen palatal bones, which latter make a prominent ridge on either side of the roof of the mouth towards its posterior part. The basal outline of the latericorn is that of the lateral frontal feathers, as above described. It terminates in an acute angle anteriorly.

The "unguicorn" or dertrotheca is large and strong, in size, shape and general appearance calling irresistibly to mind the claw of one of the large *Felidæ*. It is much thicker, heavier and stouter than any other of the corneous elements. The convexity of its dorsal outline is great, being more than the quadrant of a circle. Its commissural edges are thin and sharp, very concave in outline: usually with an obsolete tooth, or, at least, a slight lobe.

The "naricorn" or rhinotheca is an irregularly convoluted little scroll, very thin, and delicate in texture. Its general shape is that of a turgid cone, whose apex presents backwards, and whose obliquely-truncated, irregularly-shaped base is anterior. This is simply inserted in the emargination of the under edge of the culminicorn, above described. A corneous parietes is wanting on the side which lies towards the median line of the bill; and, more anteriorly, there are numerous delicate convolutions, impossible to describe intelligibly. The general effect of these, however, is to produce a division into two parts of each nasal orifice, by a process which projects upwards and inwards. When the naricorns are *in situ*, the outer of these divisions, irregularly circular in shape, forms the most conspicuous part, and looks forward and a little upwards. The inner is much smaller, and hidden under a projecting ridge; and its aspect is quite lateral.

The "ramicorn" which covers the sides of the rami of the lower mandible is chiefly noticeable for the peculiar outline of its base, which, as already stated, formed the distinguishing feature of the under mandible of this species. It is deeply concave in outline; the superior cornu of the semilune running as an acute process, far upwards and backwards to the commissural termination. Terminally, the fusion with the inferior unguicorn is very incomplete. Its superior border runs downwards with a long concave sweep from base to tip; having posteriorly an obsolete groove for the reception of a ridge from the upper mandible. Inside the mouth, more anteriorly, the inner face of the ramicorn presents an elongated extensive ridge, whose superior aspect is concave, both longitudinally and transversely. This ridge rises higher and higher as it proceeds forward, till at its termination it is on a level with the commissural edge. The ridge in the bone itself is slight in size, compared with that produced by the folding over it of the heavy corneous covering.

The "inferior unguicorn" or myxotheca is subrectangular in its lateral aspect, the antero-superior angle being rounded off, and its posterior margin a little convex. Its tomial edges are sharp; and rise considerably above the edges of the bone they cover.

The "interramicorn" forms the gonal element of the bill. It is narrow, elongated and subcylindrical in shape; anteriorly completely fused with the myxotheca; posteriorly extending on the median line a considerable distance into the interramal space, running to a fine point, and very gradually merging its corneous texture into that of ordinary dermal tissue.

The general shape of the bill appears sufficiently elucidated in the preceding descriptions of its several elements. The features whereby it is differentiated from that of any other species are these: Its great size, (chord of

culmen 6·50 to 7·50;) its great breadth and strength; width and concavity of the culmen; huge, strong unguis; peculiar convolutions of the naricorn;* the outline of the feathers, *particularly* on the side of the under mandible; and the uniform, very light yellowish color. These points will always separate from *brachyura* specimens of every variety of size and color.

The *D. spadicea* of Gmelin and Latham is now universally conceded to be based upon the young of this species. Latham's *spadicea var. B.*, however, I consider to be the young *brachyura*, for reasons stated elsewhere.

Mons. R. P. Lesson, holding that *spadicea* is distinct from *exulans*, commits the curious error of citing in support of his views a note sent him by Dr. Garnot, which refers to *Phœbetria fuliginosa*.†

Diomedea adusta Tsch. seems hardly different from this species, to which it is unhesitatingly referred by Dr. Schlegel.

DIOMEDEA BRACHYURA Temm.

Diomedea spadicea, var. B., Lath. Gen. Hist. Birds, 1824, vol. x. p. 52, No. 2, var. B.; (cites Pl. Enl. 963).

Diomedea brachyura, Temminck, Pl. color. No. 554, adult. (cites Pl. Enlum. 963, as young.) Schlegel, Fn. Japon. pl. 66. (Young.) Gould B. Aust. vii. pl. 39, and of authors generally: excluding "*brachyura* juv." of Cassin and Lawrence, which is *nigripes* Audubon.

Diomedea epomophora, Lesson, Man. Orn. ii. 1828, p. 351.—Id. Traité d'Ornith., 1831, p. 609. Tschudi, Cab. Journ. f. Ornith., 1856, p. 156. Bp. C. A., 1855, ii. p. 185, [haud dubié.]

"*Diomedea chinensis*, Temminck."

Habitat.—Pacific Ocean at large. Abundant in the China Seas, and on the west coast of North America to a quite high latitude.

As is the case with other species, this one is readily diagnosticable by its bill alone. This is of the same fundamental character as that of *exulans;* but it is smaller, weaker, more compressed, with a vastly less concave culmen, less elevated, robust, and more attenuated and decurved unguis; and there is a very marked difference in the outline of the feathers around its base.

The frontal feathers embrace the bill in a nearly straight line as far as the lateral sulcus; forming almost no concavity on the culmen. Along the base of the latericorn, they run slightly obliquely backwards to the commissure. On the sides of the lower mandible they extend but slightly further than on the upper, having a scarcely convex outline.

The bill is stout, being especially wide at its base, which is large and heavy. Anterior to the nostrils, the culminicorn is compressed, and sometimes obsoletely carinated; posterior to them, it very rapidly flattens and widens, and extends so far downwards on either side that there is allowed no projection of the post-ro-superior corner of the latericorn. The latter, with the exception of this feature, and of a straighter commissural edge, is much as in *exulans*.

The dertrum is comparatively small: hardly rises above the level of the culmen; and is by no means so convex and hooked at the tip as in *exulans*. The myxa is longer, narrower and more attenuated.

The straightness of the commissure as compared with that of *exulans;* and the different outline of the feathers on the side of the lower mandible, are the main points wherein the outline of the ramicorns of the two species differ.

The nostrils are as in *exulans*, but smaller. The variations in plumage of

* Existing, but to a less extent, in some other species.

† Lesson, Man., 1828, ii. p. 390.—"Cette espèce"—*spadicea*—"a eté regardée comme le jeune âge du *exulans;* mais nous ne partageons pas cette opinion. A ce sujet nous imprimerons textuellement une note, que nous a remise M. le Docteur Garnot * * il s'exprime ainsi * * * autour des yeux qui sont brun clair on voit un petite cercle de plumes blanches interrompu par une tache noir à l'angle interne de l'œil; le bec est noir; la mandibule inférieure presente sur ses faces deux lignes blanches membraneuses," etc., from which expressions it is palpable that a specimen of *fuliginosa* furnished the subject of the note.

this species are quite parallel with those of *exulans*, and need not detain us, as they are well known. A shining rusty yellow suffusion of the feathers of the head and neck is met with in perhaps the majority of adult specimens.

That this species is the *spadicea* var. B. of Latham, as above, when in the fuliginous state of plumage, is evidenced, if not by Latham's brief description, by his citation of Pl. Enl., No. 963, which gives correctly the outline of the frontal feathers and other points, whereby it is distinguishable from the young *exulans*. The same plate is also cited by Temminck himself as representing the young *brachyura*.

A specimen before me, unquestionably *brachyura*, is in precisely the state of plumage described under the name *epomophora* by Lesson in his works above cited, and recognized as a valid species by Tschudi and Bonaparte. The relative amount of black and white on the wings is very variable, the latter color sometimes pervading all the coverts; and at others being restricted to a small spot at the elbow, producing the appearance which suggested Lesson's name.

The questions arising from the confounding of *nigripes* Audubon with this species are discussed under head of the latter.

NOTE.—I find in the Smithsonian Institution a skull of an Albatross, wanting the lower jaw, in general features most like that of *brachyura*, (numerous examples of which are before me,) but differing as follows:—

It is considerably narrower and smaller in nearly all of its dimensions; the bill especially being slenderer, weaker and more compressed, with a less elevated and smaller unguis. The frontal outline is decidedly more concave on the median line. The culminicorn was narrower and less flattened basally; did not descend so low to meet the latericorn behind the nostrils, and was more convex along its dorsal outline. The fronto-maxillary suture is narrower. The palatal bones are smaller and narrower, and sink to the level of the commissural edge much sooner.

A most marked difference is seen in the supra-orbital fossa for the lodgment of the gland, whose secretion is poured into the nasal cavity. It is very small, and particularly narrow; so that the least width between it and its fellow is greater than in *brachyura*, although the skull is narrower. These fossæ have no floors whatever on their anterior halves.

Numerous other minor differences may be summed up as resulting from the smallness and narrowness of the skull, which is well illustrated by the following measurements. It will be noted that the bill is absolutely longer, and therefore still more comparatively elongated than in *brachyura*.

Dimension.	*D. brachyura.*	*D. leptorhyncha.*
Fronto-maxillary suture to tip of bill	5·40	5·75
" " " " occiput	2·75	2·37
Greatest width of bill	1·37	1·08
" " " skull (at post-orbital processes)	2·62	2·37
Width of fronto-maxillary suture	1·00	0·93
Length of supra orbital fossa	1·30	1·07

Upon these meagre, though decided data, I do not like to formally introduce a species; and must, therefore, for the present, content myself with pointing out the differences which exist in the specimen to which I have affixed the above name of *leptorhyncha*.

DIOMEDEA NIGRIPES Audubon.

Diomedea nigripes, Audubon, Orn. Biog. v. 1839, p. 327. Audubon, Birds Amer. vii. 1842, p. 198. [West coast Amer.] Cassin, Illust. B. Cal. & Texas, 1853, p. 210, pl. 35. [Cala.] Schlegel, Mon. *Proc.* Mus. Pays-

Bas, 1863, p. 33. [China.] Swinhoe, Ibis, 1863, p. 431. [China Seas.]

Diomedea brachyura juv. Cassin, Illust. B. Cal. & Tex., 1853, p. 291. Lawrence, Baird's B. N. Amer., 1858, p. 822.

Habitat.—North Pacific. Coasts of Asia and America.

*Description.** Bill about a third longer than the head, slightly surpassing the tarsus, equal to the middle toe without its claw: comparatively stouter, and basally wider, than that of any other species (except *gibbosa?*). The culmen is perfectly straight to the middle of the bill; and has thence only a just appreciable concavity to the unguis; which latter is weak and small, scarcely rises above the level of the culmen proper, and is only moderately decurved and acute. The culminicorn is moderately wide, and subcarinated beyond the nostrils; posterior to them it is flatter and wider, spreading down so far on either side as to *overlap* the upper edge of the latericorn. Its comparative width is greater than in any other species. Although the basal outline is essentially rounded, as in *brachyura*, there is yet a slight angle formed on the median line, readily perceptible, which is not the case in *brachyura*. The great comparative width of the bill is produced chiefly by the turgid and protuberant latericorns, which give it an air of great thickness and solidity. The lateral sulcus is nearly straight from nostrils to unguis, and thence is only slightly decurved. The commissure is almost straight to the unguis. The outline of the inferior mandibular rami is quite straight to the inferior unguis, the point of which is somewhat elongated and decurved. The interramicorn is small and short, though quite convex in outline. The feathers on the side of the lower mandible extend further than on the upper; their outline has a gentle convexity. The nostrils are of moderate size; very short; rather obliquely placed, presenting upwards and forwards; and the emargination of the culminicorn, to allow of their protrusion, is very deep.

The tail is of moderate length, contained about three times in the wing from the carpal joint; is nearly square, the feathers having but a slight graduation, and all being broad to their very tips. (The tail of *brachyura* is contained about 3½ times in the wing.)

The tarsus is less than the middle toe without its claw, about equal to the inner without its claw; slender, moderately compressed. The outer toe is longer than the middle; the tips of the claws fall together. The tip of the inner claw about reaches the base of the middle one.

The plumage is dark chocolate brown; lighter and rather tending to plumbeous gray on the under parts generally. Some of the dorsal feathers, and most of the wing-coverts, have light grayish brown edges, as if faded; and a few feathers on the elbow are whitish except terminally. The region all around the bill is hoary white for a limited space; and then shades rapidly into the prevailing color of the head. A streak over and behind the eye and a spot just in front of it are nearly pure black. The primary quills are black, with a plumbeous cast on their inner vanes; their shafts bright yellow to near the tips. The tail is brownish black; paler below; the shafts dull whitish except apically. The long upper tail coverts which reach within one and a half inches of the end of the tail, are lighter brown than the rest of the upper parts, having sometimes a slight rufous tint. The feet and webs are black. The bill in the dry state is dark brown, almost black on the nail; its basal portions with a hoary glaucescence, its median portions tinged with reddish brown.

Chord of culmen 4·00, its curve 4·60, from feathers on side of upper mandible to its tip 3·50; ditto lower mandible 3·20; height of bill at base 1·50; greatest width 1·25. Tarsus 3·70; middle toe and claw 4·50, outer do. 4·50, inner do. 4·00. Wing 19 to 20. Tail about 6·50.

The preceding paragraphs are descriptive of a most excellent species of Al-

* Taken from several typical examples from the coast of California in Mus. Smiths.

batross, very abundant in the North Pacific. It is readily distinguishable from the young *brachyura*, to which it assimilates so closely in its plumage, by its bill, which Dr. Schlegel has happily described as "très court, quoique gros." The shortness of the bill; its great width, especially basally where the culminicorn is so broad and descends so low as to overlap the latericorn; the general straightness of its several outlines, and its color; the relative proportions of the wings and tail; and the proportions and color of the feet, all furnish data ample for its separation from *brachyura*. So far as now known, the fuliginous plumage above described is its only one; but should it ever assume a livery like that of *brachyura*, still the above points of form will readily characterize it. The only question then is as to the name to be employed for it. American writers have without exception identified the "*nigripes*" of Audubon with the young *brachyura*.

Unfortunately I cannot find the type specimen of *nigripes* among the many types of other species of Mr. Audubon now in the Smithsonian Museum. I have before me the types of his "chlororhynchos" and "fusca;" but "nigripes" has been mislaid. We have therefore only his description as a guide; from which we must determine whether he had in view the present species or a young *brachyura*, also found on the Pacific coast of North America. In the latter event *nigripes* would become a synonym, and a new name be required for the species now under consideration.

Examining the dimensions given by Audubon we find several discrepancies. In general they may be stated as too large. The bill is by no means "five" inches long,—especially along the edge of the under mandible. The tail is six or more instead of "three" inches. The dimension given for the inner toe ($1\frac{0}{1\frac{1}{2}}$) is doubtless a typographical error. By carefully measuring Audubon's specimen of "chlororhynchos," I find that he took the *curve* of the culmen, not its chord. Applying this test to the specimens before me they measure 4·50 to 4·75 inches; which is sufficiently near the dimensions he states. But five inches along the edge of the under mandible is too great, even for the majority of adult *brachyura;* while three inches as the length of tail, is wide of the mark for either species. Eliminating palpable errors however, there is nothing in his description or measurements absolutely incompatible with the present species, though much confirming a suspicion that he may really have had a young *brachyura* in view; and I therefore think it best, at least until his type can be found, to accept his name, now well established, for this species, especially as the necessity for a new one will thereby be obviated.

Diomedea gibbosa Gould.

D. gibbosa, Gould, Ann. Mag. N. H. 1844, xiii. p. 361. Id. Introd. B. Aust. 1848, p. 115.

Habitat.—"North Pacific."

Of this species, which is autoptically unknown to me, Mr. Gould says: "It differs from every other that has come under my notice in the peculiar swollen and raised form of the upper mandible, which moreover rises high up on the forehead;" and further describes it as having the "face, ear coverts, chin, abdomen, upper and under tail-coverts white; the remainder of the plumage very dark brown approaching on the occiput, back of the neck, and wings, to black; bill yellowish horn color, becoming darker at the tip and at the base; feet in the specimen dark brown, but doubtless of a bluish gray, inclining to flesh color, in the living bird. Total length 30 inches; bill 4; wing 21; tail 7; tarsi 4."

This supposed species is by Mr. G. R. Gray placed as a synonym of *nigripes* Audubon. The dimensions and description in general accord well; and certain points of difference of coloration may be dependant upon age. It is not impossible that *gibbosa* is based upon the fully adult *nigripes*, in a plumage unknown until described by Mr. Gould. But comparisons of specimens are

requisite to settle definitely, this point, upon which at present I have no opinion to offer.

DIOMEDEA MELANOPHRYS Boie.

Diomedea melanophrys, Boie, Temm. Pl. Col. No. 456. Gould, B. Aust. pl. 43; and of authors generally.

Habitat.—Southern Oceans generally.

The bill is moderately compressed throughout, least so at the base where it is very high or deep. The culmen is transversely rounded, non-carinated: its dorsal outline moderately concave, descending from the forehead nearly in a straight line to near the middle of the bill, whence it gradually ascends to the unguis. The latter is very convex and much decurved, though not rising so high as in some other species. The culminicorn basally descends a little on either side to overlap the roots of the nostrils, and to coalesce with the latericorn; no space of soft skin being interposed. The lateral sulcus follows very nearly the curve of the culmen, to near the unguis, where it rapidly decurves. The commissural edge of the upper mandible is lightly curved. The outline of the rami of the inferior mandible is nearly straight; the interramicorn somewhat protuberant, and extending far into the submental space. The inferior unguicorn is much compressed, not very deep, its apex rather acute, but little attenuated.

The nostrils are short and small; quite different in this feature from those of *exulans* or *brachyura*. They are subconical in general shape; being considerably dilated anteriorly, and basally narrowing to a point; their orifices considerably dilated, with thin margins; suboval in shape, looking upwards and forwards. This description of nostril is applicable to the other species of this subdivision of the genus.

The frontal feathers embrace the base of the bill in a nearly straight line; having a slight forward obliquity, however, as they descend on the sides of the upper mandible. On the culmen a very slightly reëntrant curve (not angle) is formed. On the side of the lower mandible the feathers begin slightly posterior to their termination on the upper; extending somewhat forward, and with a slight convexity, as they go downwards.

The bill is yellow, more or less pure and uniform in tint; in immature birds clouded with brown. Some portion of the unguis is usually dark colored. The soft skin at the extreme base of the bill makes a narrow black line all around.

White; back plumbeous black, more cinereous anteriorly, where it merges gradually into the white of the neck. Wings and tail black; the latter with a grayish or plumbeous tinge, especially basally. Shafts of quills yellowish, becoming black terminally. Shafts of tail feathers white throughout. A cinereous black transocular fascia. "Legs and toes yellowish white, the interdigital membrane and the joints washed with blue." (Gould.)

Chord of culmen 4·25; height at base 1·75; width 1·00; from feathers on side of lower mandible to its tip 3·75. Tarsus 3·25; middle toe 4·75; outer 4·50; inner 4·00. Wing 20·00; tail 9·00; its graduation 2·00.

DIOMEDEA GILLIANA Coues, nov. sp.

Belonging to the group of white, black-backed Albatrosses of which *melanophrys* is typical, and with the characters of the culminicorn generally as in that species. The shape of the bill, however, most nearly approaches that of *culminata*; but the characters of the culminicorn posterior to the nostrils are quite diverse from those of the latter species, as follows:—

Instead of continuing, between the nostrils and the forehead, no broader than it is anterior to them, it there widens, descending on either side to overlap their roots, and to coalesce by a simple sulcus with the upper edge of the latericorn. There is thus left no space to be filled by soft skin. The dorsal

outline of the culminicorn is not so concave as in *culminata;* does not begin to curve downwards so immediately from the forehead; does not dip so low down at the middle of the bill; is less flattened and depressed on top, and has a more decidedly rounded transverse outline. The culminicorn has considerably more of lateral extension downwards before it reaches the lateral sulcus.

The outline of the frontal feathers shows an approach to the character seen in *fuliginosa;* the root of the culmen extending nearly as far up on the forehead as in *exulans.* Still the outline is a simple concavity, not a sharp reëntrant angle. On the sides of the lower mandible the feathers start a little posterior to their termination on the upper and curve downwards and considerably forwards with a decidedly convex outline.

The base of the culminicorn and latericorn are transversely rugose; the corrugations being mainly parallel with the outline of the frontal feathers.

The lateral sulcus is gently curved from base to unguis; and on its ungual extent is less deflected than in any other species. The interramicorn is prominent; and extremely elongated before it finally looses itself in the submental space.

In the dried specimen the bill presents none of the bright parti-coloration of *culminata, chlororhyncha,* and *cauta;* while its color as well as its shape are sufficiently diverse from those of *melanophrys.* It is a plain uniform olivaceous brownish throughout; the ungues darker, and inclining to black; the extreme tip of the upper mandible yellowish. That this color is not an evidence of immaturity is evinced by the plumage which is palpably that of a fully adult bird.

Chord of the culmen 5·00 inches. Height of bill at base 1·75; at middle slightly over one inch; at unguis 1·12. Width at base 1·45. Tarsus 3·00; middle toe 4·75, outer toe 4·60, inner toe 4·00. Wing about 20 00; tail about 9·00.

The coloration of the plumage is that of *melanophrys* and the rest of this group, with this exception: The whole under surface of the wings is concolor with the upper; whereas in the other species a large area is white.

In carefully examining the superb series of Albatrosses in the Philadelphia Academy, which contains examples of all known species except *olivaceirostris* and *gibbosa*, I find a specimen of which the preceding paragraphs are descriptive. It is unlabelled as to name, locality or donor; and Mr. Cassin has no recollection whence it was obtained. I find it impossible to refer it to any known species; and am therefore constrained, somewhat reluctantly, to regard it as a previously undescribed one. I am autopically familiar with all the recognized species except *olivaceirostris* and *gibbosa.* The former of these is said to have a bill "3 inches and three-eighths long from the *gape* to the tip, and of a uniform olive green, and in form more slender and elegant," etc.; with which description the characters of our bird are totally discordant. There is no "peculiar swollen and raised form of the upper mandible" suggestive of the name *gibbosa*, or rendering its reference to that species admissable.

From *chlororhyncha, culminata,* and *cauta* it is at once distinguished by the color of the bill and especially by the lateral extension downwards of the base of the culminicorn, and its coalescence with the latericorn, thus cutting off the naked space which exists behind the nostrils of these species.

Agreeing in this latter respect with *melanophrys*, the shape no less than the coloration of the bill, as well as the peculiar color of the under surfaces of the wings forbid its reference to that species. Until these features are shown to be acoidental, or not incompatible with the variations to which *melanophrys* is subject, the species must be regarded as a valid one; since there are no others than those above compared, to which it bears any sort of resemblance.

I trust that this species may prove valid, if for no other reason than that it may continue to bear the name I have fixed to it in pleasant remembrance of years of uninterrupted friendly intercourse; although Professor Theodore Gill needs no such slight tribute from me, to enhance the enviable reputation to

[May,

which his extensive researches in almost every department of Zoology so justly entitle him.

DIOMEDEA CAUTA Gould.

Diomedea cauta, Gould, P. Z. S. viii. p. 177. Id. Ann. Mag. Nat. Hist. xiii. 1844, p. 360. Id. B. Aust. pl. 40. Gray, Gen. Birds, (plate of bill), and of authors.

Habitat.—From the south coast of Van Diemen's Land.

A beautiful species having the colors of plumage of the *melanophrys* group; readily distinguishable from all other species by the following peculiarities in the shape and color of the bill, and outline of the frontal feathers.

The frontal feathers lie in a straight or slightly convex outline across the base of the culmen, and then descend perpendicularly to the commissure; forming a slight reëntrant angle on each side of the base of the culminicorn. From exactly opposite their termination on the commissural edge of the upper mandible those on the lower start, and descend in a straight line with a slight forward obliquity, forming a very obtuse angle with those on the upper mandible.

The dorsal outline of the culmen descends from the forehead with a gentle curve, to rise again on the unguis, but not so high as at the forehead. The point of greatest concavity is opposite the middle of the bill. Basally the culminicorn agrees with that of *culminata* and *chlororhyncha*, and differs from *melanophrys*, in not widening behind the nostrils, nor descending to overlap their bases and meet the upper edge of the latericorn; a narrow subrectangular space thus left being covered only with soft skin.

The latericorn is very broad throughout as compared with the culminicorn; *i. e.*, the lateral sulcus is placed high up. The latericorn is exceedingly deep at its base, running high up towards the sides of the base of the culminicorn, and, in consequence of the strong upward inflection of the commissure towards its base, the sides of the under mandible are also very deep basally, and run high up to form an acute angle with the feathers at the commissure.

The nostrils present no discrepancies from other species of this group.

"Bill light vinous gray or bluish horn color, except on the culmen where it is more yellow, particularly at the base; the upper mandible is surrounded at the base by a narrow belt of black, which also extends on each side of the culmen to the nostrils; base of lower mandible surrounded by a belt of rich orange, which extends to the corners of the mouth." (Gould.)

Chord of culmen 4·75; height at base 1·90; width 1·25; height at unguis 1·25; from feathers on lower mandible to the tip of its unguis 3·75. Tarsus 3·25; middle toe 5·00; outer toe 4·75; inner 4·25; wing 22·00; tail 10·00.

The plumage is that of *melanophrys* even to the transocular dark fascia; but this in the specimen before me extends quite to the bill, which is not the case in the numerous specimens of *melanophrys* examined.

A suffusion of the head and neck with pearly gray is doubtless indicative of immaturity, as is the case with other species.

This bird is superbly figured in Mr. Gould's and Mr. Gray's plates cited above. The latter is an exceedingly accurate delineation of the bill.

DIOMEDEA CULMINATA Gould.

Diomedea chlororhynchos, of Audubon's Works; witness the type specimen itself. Lawrence, Gen. Rep. Birds, N. A., 1858, p. 822. (Excl. syn.)

Diomedea culminata, Gould, Ann. & Mag. N. H. 1844, xiii. p. 361. Id. B. Aust. vii. pl. 41. Gray, Gen. Bds., 1849, pl. 179.

This species in color of plumage is quite identical with *chlororhyncha*, and the bill, in its general characteristics of shape, most resembles that of the latter species. But the bird is much larger, stouter and heavier, as will be seen by comparing the dimensions given. The bill in general terms may be stated to be heavier and stronger, though not longer than that *chlororhyncha*;

much less compressed; deeper at the middle, notwithstanding that the concavity of the culmen is much greater; and with other well-marked peculiarities, as follows:—

The dorsal outline is exceedingly concave, dipping down rapidly from the forehead, and then again being much elevated on the ungual portion. The culminicorn is broad, flattened, depressed, with no trace of carination. Its colored base, instead of being acutely pointed, (as in *chlororhyncha*,) continues of a uniform width past the nostrils to the feathers, where it is broadly rounded with a gentle convexity. There exists posterior to the nostrils a naked space of soft skin; but this is trapezoidal, not triangular in shape, in consequence of the different shape of the base of the culminicorn, just described.

The lateral sulcus is nearly straight to the unguis, where it is greatly deflected. It runs high up along the bill; or rather the dorsal outline of the culmen dips, towards the middle of the bill, so far down, that it almost lies on a level with this sulcus. The culminicorn is thus allowed scarcely anything of a lateral aspect in the middle portion of its extent. The latericorn, as a consequence, is very deep throughout, and its commissural outline is decidedly less curved. The two ungues are stout, deep and short; with considerable more convexity of outline, and less elongation and decurvation of their apices than is seen in *chlororhyncha*.

The dorsal outline of the inferior mandibular rami is quite straight. The interramicorn is prominent, but not so long as in *chlororhyncha*.

The outline of the feathers is almost exactly as in *melanophrys*; *i. e.*, they lie over the base of the culmen in nearly a straight line, or with a slight concavity; and thence extend nearly straight down the sides of the bill. There is no trace of the reëntrant angles at the sides of the base of the culminicorn seen in *chlororhyncha*. The feathers on the lower mandible have the same outline as those of *melanophrys* or *chlororhyncha*.

The colors of the bill are quite different from those of any other species, though coming nearest to *chlororhyncha*. The culminicorn is clear light yellow; (not bright orange;) and the edges of the inferior mandibular rami for three-fourths their extent are also yellow. There is no yellow line along the sides of the base of the lower mandible at its junction with the feathers. The rest of the bill is black. "In its youthful state the head and neck are dark gray, and the bill is of an almost uniform brownish black, with only an indication of the lighter color of the culmen." (Gould.)

The plumage is quite the same as that of *chlororhyncha*. The color of the back is darkest posteriorly, being anteriorly more plumbeous, and shading into the grayish pearl which washes the neck and head of the majority of specimens. Usually the feathers about the eyes are more or less dark-colored.

In young birds the whole head and neck is clouded with plumbeous gray; and the transocular fascia is more conspicuous.

Bill (chord of culmen) 4·50; height at base 1·75; at middle 1·10, at unguis 1·25; width at base 1·20. Tarsus 3·25; middle toe 5·00, outer toe 4·75, inner toe 4·25. Wing 21·00. Tail 8 to 9.

I have before me Audubon's type of the "*chlororhynchos*" of his works. It is an example of *culminata* Gould; and was doubtless procured elsewhere than "not far from the Columbia River," as falsely stated. This specimen (No. 2726 of the Smithsonian Register) is also described by Mr. Lawrence, l. c., under the same name.

I have a distinct impression of having seen, in some old work, a plate of this species (as evidenced by the yellow along the ramus of the under mandible instead of at its feathered base) under the name of "*chlororhynchos*;" but I cannot now call to mind the reference.

DIOMEDEA CHLORORHYNCHA Gmelin.

Diomedea chlororhyncha, Gm. i. 1788, p. 568. Lath. Syn. v. p. 309, pl. 94.

Lath. Ind. Orn. ii. 1790, p. 790. Temm. Pl. Col. 468. Gould, B. Aust. pl. 42, and of authors generally; but not of Audubon and Lawrence.

Diomedea (Thalassarche) chlororhyncha, Bp. C. A. ii. 1855, p. .

"*Diomedea chrysostoma*, Forst. Ed. Licht, 1844, p. 24. "Id. ic. ined. 100, 101," fide Gray.

"*Diomedea profuga*, Banks, ic. ined. t. 27," fide Gray.

"*Diomedea presaga*, Brandt," fide Lawrence.

Habitat.—Cape of Good Hope, and thence to Van Diemen's Land. Australian and South Pacific Oceans generally.

The bill is compressed in its whole extent more than in any other species except *fuliginosa*; and although somewhat stouter at the base, it is there very high as compared with its width. Its dorsal outline is very concave, descending rapidly from a point a little anterior to the extreme base of the bill, to about the middle; and not rising again very high on the unguis. Although the culminicorn is narrow and with compressed sides, it is not carinated along its dorsal line. It has a peculiar termination basally, quite unique in the genus, which single character separates it trenchantly from any other Albatross. The culminicorn does not (as in *exulans*, *melanophrys*, etc.,) spread downwards and outwards behind the nostrils to overlap their bases, but terminates by rapidly narrowing to an acute angle on the median line of the bill. Its hard, brightly colored, pointed base does not quite reach to the feathers. There is thus left, between the base of the culminicorn and the upper edge of the latericorn, a somewhat triangular space of softish integument, not brightly colored; and corrugated in the dry state.

The lateral sulcus on the upper mandible does not extend further towards the base of the bill than the nostrils: the soft skin just spoken of taking its place thence to the feathers. Beginning then with the nostrils, it has a slight downward convexity as far as the unguis; thence it is greatly deflected. As usual, a slight ridge lies in this sulcus for its whole length. The commissural edge of the upper mandible is strongly curved, its convexity looking downwards. The dorsal outline of the inferior mandibular rami is straight or very slightly concave. The interramicorn is thin, not very prominent, but prolonged far along the chin before it merges into soft skin.

The two ungues, taken together, are characterized by their slight comparative depth and degree of convexity, and their extreme compression and elongation; and by the acuteness and decurvation of their apices.

The nostrils are exactly as described under *melanophrys*.

The frontal feathers are peculiar in outline. They lie straight across the base of the culmen, or even have a slight convexity, as far as the upper corner of the base of the latericorn. Thence they descend the side of the bill, with a slightly convex outline, and some little obliquity forwards; forming more decidedly reëntrant angles at the superior basal corners of the latericorns than is found in any other species. On the side of the lower mandible, beginning at a point slightly posterior to their termination on the upper mandible, they descend with an outline parallel to that of those on the upper mandible.

Chord of culmen 4·50; height of bill at base 1·50, at unguis 1·00; width at base 1·00. Tarsus 2·75; middle toe 4·25; outer toe 4·00; inner toe 3·75. Wing about 19·00. Tail 7·00.

White; including rump, upper tail coverts and under surfaces of the wings; back and wings ashy brown, the latter darkest. Primary shafts light brown basally, black apically. Tail grayish or plumbeous black, lightest basally; its shafts chiefly white. Some part of the head and neck in the majority of specimens is clouded with pearly gray. There is more or less of a grayish plumbeous transocular fascia, as in *melanophrys*. The culminicorn is bright orange yellow; and a narrow line of the same color lies along the sides of the base of the under mandible. The rest of the bill is blackish; there being no bright color along the dorsal outline of the inferior mandibular rami, as seen in *culminata*. The feet are livid flesh, or bluish white.

Some malapplications of the name of this species to *culminata* Gould, are noticed under the head of the latter. I quote the names "*profuga* Banks" and "*presaga* Brandt" respectively on the authority of Mr. Gray and Mr. Lawrence, not having an opportunity of verifying these references.

DIOMEDEA OLIVACEIROSTRIS Gould.

Diomedea olivaceorhyncha, Gould, Ann. Mag. N. H. 1844, xiii. p. 361. Id Introd. B. Aust., p. 115.

Diomedea olivaceirostris, Bonaparte, C. A. 1855, p. 185, correcting a hybrid name.

This species is based upon a bill only, which was in possession of Sir Wm. Jardine, and supposed to come from the China seas. Mr. Gould states that it "is three inches and three-eighths long from the gape to the tip, of a uniform olive green, and in form more slender and elegant than that of the other members of the genus," which comprises the sum total of our knowledge concerning the species.

PHŒBETRIA FULIGINOSA (Gm.) Reich.

Diomedea fuliginosa, Gmelin, Syst. Nat. i. pt. ii. p. 568. Lath. Ind. Orn. ii. 1790, p. 791. Temminck. Pl. Col. 469. And of authors generally.

Diomedea (Phœbetria) fuliginosa, Bonap. Consp. Av., ii. 1855, p.

Diomedea spadicea, Lesson, Man. ii. 1828, p. 391; description. Not of Lath.

Diomedea palpebrata, Forster, "ic. ined. No. 102." Id. Ed. Licht, 1844. p.

Diomedea antarctica, Banks, "ic. ined. No. 26."

Diomedea fusca of Audubon's works.

Habitat. Southern oceans at large.

The bill of this species is remarkable in its extreme compression; its basal outline; and the presence of a sulcus on the lower mandible.

The feathers retreat rapidly, with a gentle curve, from their point of greatest development on the commissural edge of the upper mandible to form an exceedingly acute reëntrant angle on the forehead. Those on the side of the lower mandible extend in an exceedingly acute salient angle, to a point much beyond the termination of the nostrils; their upper outline a trifle oblique to the commissural edge of the lower mandible; their under more decidedly oblique to the outline of the inferior mandibular rami.

The culminicorn is much compressed, with but slightly convex sides, and a decidedly carinated ridge. The dorsal outline forms a gentle and continuous curve from the very feathers to the base of the unguis. The latter hardly rises above the level of the culmen proper: is rather the reverse of robust; its top moderately decurved, and only slightly overhanging the lower. The curve of the superior lateral sulcus is intermediate between *exulans* and *brachyura*. The commissure forms a gentle and continuous curve from the base of the unguis.

The commissural edge of the under mandible corresponds to that of the upper. The dorsal outline of the rami is perfectly straight. The inferior unguicorn is convex and protuberant, but extends only a short distance into the mental space.

The median longitudinal lateral sulcus of the lower mandible terminates abruptly at the unguis. Basally it divaricates to receive the salient feathers; the upper crus being the best marked, and forming the real continuation of the sulcus. This groove is sometimes concolor with the bill; more often it is brightly colored, being yellow or pinkish.

The nostrils are peculiar in their very small calibre, perhaps less than that of any other species. They are almost buried between the culminal and lateral elements of the bill, the two meeting posterior to the nares. The orifice is subcircular, presenting forwards and upwards with no lateral aspect.

The graduation of the lateral rectrices is enhanced in producing a cuneate tail, by the elongation of the median pair which project beyond the next ones, and are narrowly accuminate. The tips of the lateral feathers are rounded.

The bill is black, except its sulcus. The feet are flesh colored or dull whitish, becoming yellowish in the dried state. The edges of the eyelids are pure white except just at the anterior canthus.

The perfectly and uniformly fuliginous color (darkest about the face and on the wings and tail) which is the ordinary plumage, sometimes gives way to a much lighter, clearer and more cinereous color. Examples of this coloration, doubtless due to age, are in the Philadelphia Academy and Smithsonian Institution. The most extreme case I have met with is as follows: Neck all around, upper part of back and whole under parts nebulated with ashy or grayish white. Lower part of back, wing-coverts, scapulars, etc., light plumbeous gray. Wings and tail ashy or plumbeous blackish, lightest on their inner webs, their shafts chiefly whitish. On the face, crown and sides of the head the fuliginous holds, deepest in tint immediately around the bill. The nape and hind neck, and some of the wing coverts show traces of ferrugineous.

Chord of culmen 4 to 4·50, height of bill at base 1·50, at unguis 1·00, width at base ·75. From feathers on commissure to tip 3·50, from feathers on lower mandible 2.50. Tarsus about 3·00; middle toe and claw 4·75, outer 4·50, inner 4·00. Wing 21·00, tail ·10, its graduation 3·50 to 4 50.

I have examined the type of *Diomedea fusca* Aud. now in the Smithsonian Institution.

The following is a synopsis of the genera and species of the *Diomedeinæ*.

Family *PROCELLARIIDÆ*.

Sub-family *DIOMEDEINÆ*.

Chs. The tubular nostrils are separated, and placed on either side of the culmen. The hallux is absent. The exterior toes have a wide membranous fringe.

Genus I. *Diomedea*. Bill stout, or moderately compressed. No sulcus on lower mandible. Tail short or moderate, more or less rounded. Nostrils large.

A. Bill very broad. Tail short; contained nearly, quite, or more than three times in the wing..... .....*Diomedea et Phœbastria* Reich.

1. D. EXULANS L. (*spadicea* Gm. Lath. (juv.) *albatrus* Pall. Forst., *adusta* Tsch. Bill 7 inches. Frontal feathers forming a deep concavity on the culmen; those on side of lower mandible extending to a point opposite middle of nostrils, with an exceedingly convex outline.

2. D. BRACHYURA Temm. (*spadicea* var. B. Lath. (juv.) *epomophora* Less. Tsch. Bp.) Bill 5 to 6 inches. Frontal feathers embracing the bill nearly in a straight line: those on side of lower mandible extending hardly further than on upper, with a barely convex outline.

[2a? D. LEPTORHYNCHA Coues. Doubtfully based upon a skull differing somewhat in proportions from that of *brachyura*. See anteà.]

3. D. NIGRIPES Aud. (*brachyura* juv. Cass. Lawr.) Bill 4 inches; width at base 1·25; height 1·50; very robust for its length. Frontal outline nearly as in *brachyura*.

?4. D. GIBBOSA Gould. "With a peculiar swollen and raised form of the upper mandible, which moreover rises high up on the forehead. Bill 4." (Probably = *nigripes* Aud.)

B. Bill compressed. Tail elongated, rounded, nearly half as long as the wing from the carpal joint. White, with black back and wings. A transocular fascia..... ....(*Thalassarche* Reich.)

a. The culminicorn widens and descends on either side behind the nostrils to coalesce with the latericorn.

5. D. MELANOPHRYS Boie. Temm. Frontal feathers with a slight reëntrant curve on the culmen. Chord of culmen 4·25. Width of bill at base 1·00; height 1·75. Bill uniform light yellow.

6. D. GILLIANA Coues. Frontal feathers with a decided reëntrant curve on the culmen (nearly as great as in *exulans*.) Chord of culmen 5 00; width of bill at base 1·45; height 1·75. Bill uniform dark brown. (Essential characteristics of culminicorn of *melanophrys*; general shape of bill of *culminata*.)

b. The culminicorn does not widen and descend to coalesce with the latericorn posterior to the nostrils, but continues narrow to the frontal feathers.

7. D. CAUTA Gould. Chord of culmen 4·75. Frontal feathers with a slightly convex outline across the culmen: thence descending in a nearly straight line. Bill gray or bluish brown; the culmen yellowish; a narrow belt of black around base of upper mandible; one of orange around base of lower, the latter extending to the angle of the mouth.

8. D. CULMINATA Gould. (*chlororhyncha* Aud. Lawr. nec. Gm.) Base of culminicorn broad and rounded. Frontal feathers with a slightly concave outline across culmen. Chord of culmen 4·50. Bill black; culmen and lower edges of inferior mandibular rami bright yellow.

9. D. CHLORORHYNCHA Gm. (nec. Aud. Lawr. *chrysostoma* Forst. "*profuga* Banks;" "*presaga* Brandt.") Base of culminicorn tapering to an acute angle. Frontal feathers straight or with slight convexity across culmen: thence downwards with some forward obliquity, and slight convexity of outline, forming a sharp reëntrant angle at upper corner of base of latericorn. Chord of culmen 4·50. Bill black. Culmen, and a narrow perpendicular line along the sides of the base of the under mandible, bright yellow.

10. D. OLIVACEIROSTRIS Gould. Bill slender, uniform olive green, three and three-eighths long from gape to tip.

GENUS II. PHŒBETRIA Reich. Bill excessively compressed. A sulcus on sides of lower mandible. Feathers forming a deep reëntrant angle on culmen; an acute salient on one side of lower mandible. Nostrils very narrow. Tail elongated, cuneate.

11. P. FULIGINOSA Reich. ex *Diomedea fuliginosa* Gm. (*antarctica* Banks; *palpebrata* Forst.; *fusca* Aud.) Height of bill at base 1·50, width ·75. The culmen is carinated for its basal half.

Sub-family *HALODROMINÆ*.

Some general remarks upon the fundamental characters of this interesting group have already been given at the head of the present article. We may at once proceed to the consideration of the single genus by which it is represented.

Genus PELECANOIDES Lacép.

Procellaria sp. Gmelin et auct. aliq.
Pelecanoides, Lacépède, Mem. de l'Inst. 1800–1, p. 517. Typus *Proc. urinatrix* Gm.
Haladroma, Illiger, Prodromus, 1811, p. 273. Typus idem.
Onocralus, Rafinesque, 1815; fide Bon.
Puffinuria, Lesson, Man. 1828, ii, p. 392: Id. Traité Ornith. 1831, p. 614. Typus *P. Garnoti* Less.

Concerning these numerous names which have been proposed for this genus

the preponderance of authority is in favor of the adoption of that of Illiger. I can, however, discern no cause why Lacépède's name should be superseded. The reasons given by Illiger, in proposing *Haladroma*, and by Lesson in founding *Puffinuria*, certainly seem invalid. To G. R. Gray is, I believe, due the credit of restoring the rightful appellation of Lacépède.

The type which represents the genus, although so curiously anomalous, is so well known, that a detailed description would be out of place here. Only a few of its more salient points need be noticed.

The perfectly vertical nostrils are surrounded by an elevated wall, whose contour, in consequence of a slight emargination posteriorly, and a corresponding protuberance anteriorly, on the median line, is somewhat cordiform. The wall has considerable thickness basally; but much bevelling superiorly gives it an extremely thin edge. The internasal septum is moderately thick; and from either side a process projects transversely into the nasal orifice. In shape each nostril is suboval; being somewhat elongated anteriorly, and a straightening of its inner border being produced by their mutual apposition.

The dertrum or unguis is long, reaching quite to the nostrils; and, for this family, is only moderately uncinated. Except at its extreme base it is distinctly carinated, and its sides are much compressed.

The myxa is unusually small and narrow, with a very acute tip, and extremely concave gonys. The sulci separating the myxotheca from the rest of the mandible, and the lateral one on the gnathidia are strongly marked.

The unusual amount of divarication of the concavo-convex gnathidia, which causes so wide a submentum, is, in the upper mandible, accompanied by a corresponding dilation of the lateral elements; which latter are also turgid and inflated.

The tarsus is excessively compressed, and at the same time very deep antero-posteriorly; giving to its transverse section a narrowly elliptical shape, like that which obtains in the *Colymbidæ*. It is reticulated as in the *Procellaridæ*, and also the majority of the *Alcidæ*, though *Mergulus* has anteriorly transverse imbricated scales. The proportions of the anterior toes are as in the other *Procellariidæ*.

In the wings and tail the urinatorial aspect is most decidedly marked. The very short wings, with their stiff, falcate, subacuminate primaries hardly reach to the end of the exceedingly abbreviated tail.

The plumage is essentially diverse from that of any other Procellaridian, in its compact imbrication, and oily glossiness, which comes nearest to that of the Loons; and is eminently adapted to resist the action of the water in which the habits of this species cause them so constantly to be submerged.

Concerning the number of species to be enumerated authors are greatly at variance. To a comparatively recent date but a single one was supposed to exist. M. Temminck, in figuring the type of MM. Quoy and Gaimard's *P. Berardii*, is of opinion that both *urinatrix* and *Garnoti* should be referred to it. M. Lesson, after describing *Puffinuria Garnoti* in 1826, doubtfully refers it to *Proc. urinatrix* Gm.* Prince Bonaparte unites *Garnoti* and *urinatrix*, and considers *Berardii* as distinct. Mr. G. R. Gray, and more recently, Dr. H. Schlegel, agree in regarding all three of the supposed species as valid. A sufficient amount of material is not at my disposal to settle these doubtful points. In a considerable number of specimens from various localities I can see what has been called *P. Berardi*, differing in some respects from the ordinary type: but have failed to detect tangible differences indicating three species. Very possibly, however, none of the specimens before me indicate the true *urinatrix*, as distinguished from *Garnoti*.

The three supposed species are based entirely upon size: a varying degree of length or robustness of bill: and coloration of the feet. Some specimens

* Traité d'Ornith. 1831, p. 720, No. 144.

before me are larger than is indicated by Dr. Schlegel as characteristic of *Garnoti:* while the feet are colored as in the smallest species, *Berardii.* A considerable amount of variation is found in examples of undoubtedly the same species; so that perhaps we might without great violence consider the different species as extremes of a single very variable type.

I am mainly indebted to Dr. Schlegel's excellent article for characters whereby to tabulate the supposed species with their synonyms. This author has had before him examples which he has considered as indicative of three species: and for the present I rely upon his judgment.

1. PELECANOIDES GARNOTI Gray ex Lesson.

Puffinuria Garnoti, Lesson, Voy. de la Coq. i. part ii. 1826, pl. 46.—(Bill and feet black. Length 8½; extent 16; bill 1 2-12ths; wing 5; feet and tail each 1½.)—Id. Man. Orn. 1828, ii. p. 394.—Id. Traité d'Orn. 1831, p. 730. (Queries *urinatrix* Gm. as syn.)

Pelecanoides Garnoti, Gray, Gen. Birds, iii. 1849, p. 646.

Haladroma Garnoti, Schlegel, Mon. *Proc.* Mus. Pays-Bas, p. 37.

Haladroma urinatrix, Bonaparte, C. A. 1856, ii. p. 206. (Excl. syn. Nec Gm. fide Schlegel, who has examined Bonaparte's types.)

Habitat.—West Coast of South America.

Ch. Largest; 8 to 8½ in length. Bill slender and elongated; black; along culmen ·75; height at end of nasal case ·25. Width near the base ·33. Tarsus blackish, 13 to 14 lines long; middle toe about one inch.

2. PELECANOIDES URINATRIX Lacép. ex Gm.

Procellaria urinatrix, Gmelin, S. N. 1788, i. part ii. p. 560, and of authors; not *Hal. urin.* of Bp.

Pelecanoides urinatrix, Lacép. et Cuv. Gray, Gen. Birds, iii. 1849, p. 646.

Haladroma urinatrix, Illiger, Prod. 1811, p. 274. Schlegel, Mon. *Proc.* Mus. Pays-Bas, 1863, p. 37.

Puffinuria urinatrix, Gould, B. Aust. pl. 60.

Haladroma Berardii, Bonap. C. A. 1856, ii. p. 206; Excl. syn. (fide Schlegel; from examination of Bp's types.)

Procellaria tridactyla, Forst. Descr. Anim. Ed. Licht. 1844, p. 1849.

Habitat.—Australian Seas.

Chs. Of medium size; feet bluish; bill robust. Wing 4·50; tail 1·40. Bill ·66; its height or width ·33; tarsus one inch. Middle toe eleven lines.

3. PELECANOIDES BERARDII Q. and G.

Pelecanoides Berardii, Quoy and Gaim. Voy. Uranie, pl. 37. Temminck, Pl. Col. No. 517. Gray, Gen. Birds, 1849, iii. p. 646.

Haladroma Berardii, Schlegel, Mon. *Proc.* Mus. Pays-Bas, 1863, p. 38; not of Bonaparte.

Habitat.—Southern Oceans.

Chs. Smallest; bill short, intermediate in robustness between that of the two foregoing; feet light colored, their membranes black. Length 7 inches; wing 4·40; tail 1·50. Bill ·55, its height or width about ·30. Tarsus ·80; middle toe ·90.

It will be observed that the differences between the size of the smallest and largest of these supposed species is not great; that an intermediate form occurs between the two extremes; that each is liable to considerable variations in size; and that the colors of the plumage of all three are identical.

Recapitulation.

The following is a summary of the genera and species of *Procellariidæ* treated of in the series of papers of which the present article is conclusive. The numbers in the third column are those of species which I have recognised, but which seem to require confirmation before their claims to validity can be considered as fully established. It will be seen that more or less of doubt attaches to 17 out of the 92 described.

	Genera.	Species.	Doubtful Species.
Procellariinæ			
Fulmareæ	3	6	
Æstrelateæ	3	23	6†
Prioneæ	3	6	1‡
Procellarieæ	7	21	5‖
Puffineæ	5*	21	1§
Diomedeinæ	2	12	2¶
Halodrominæ	1	3	2**
Total	24	92	17

NOTE. The following supposed species are not given in the body of my papers; and I only know of them by the descriptions.

Puffinus Rollandii Quoy and Gaimard, in Freynete, Voy. Antour du Monde; and Zool. Journ. iii. p. 271.

Procellaria lugubris, Tschudi, Cab. Journ. f. Ornith. 1856, iv. p. 185, (not of Natterer.) "The whole body is dark brown; the back somewhat deeper colored than the belly; the tail wholly black; the inner side of the wing darker than the outer. Bill and feet reddish; iris ashy gray. Surpasses in size *capensis*; also compressed in form. The description of *P. antarctica* is too inaccurate to say with certainty if it be the species here described. Between 46° and 36°." (*Tschudi*, ut suprà.) It is impossible to say from the description what species of *Nectris* or *Pterodroma* this is.

Procellaria maculata, loc. cit. "Island of Juan Fernandez; 33° S. Head, breast and belly wholly white; the back bluish-white with darker spots, the wings gray with bluish spots, the tips of the four longest primaries wholly black. Tail fan-shaped, grayish blue. Bill and feet deep orange yellow. Iris dark brown. About the size of the preceding species." Evidently an *Æstrelata*; but the description applies to no species with which I am acquainted. It comes nearest to *alba* Lath, or *Lessonii* Garnot.

Procellaria bicolor, op. cit. p. 187. "Bill and feet black; neck, back, and lesser wing coverts deep blackish gray, wing feathers and tail somewhat lighter. Head and throat wholly black; belly pure white." Doubtless a young *Æstrelata*; but of what species the description gives no hint.

SUPPLEMENT.

Some few additions to, and corrections of my previous papers, which subsequent investigation has brought to my knowledge, may with propriety be inserted here.

Procellarieæ.

P. 79, line 25, for "size" read "length." *H. microsoma* is rather smaller than *P. pelagica* in actual size of body, though the length of wings and tail is not less. This explains an apparent descrepancy in my statements on p. 79 and p. 90.

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* I would now unite *Thiellus* and *Nectris* with *Puffinus*, leaving but three genera to be recognized.

† These six are *Bulweria Macgillivragi* and *Procellaria Parkinsoni*, Gray; *P. neglecta and P. inscria* Schl.; *Æstrelata grisea* and *Æ. gavia* of my paper.

‡ *Prion brevirostris* Gould.

‖ Which are *P. tethys* Bp., *P. lugubris* Natterer, *P. melitensis* Schembri; *Thalassidroma Segethi* Ph. and Ldbk.; *Fregetta Lawrencii* Bp.

§ *P. sericeus* Less.

¶ *D. gibbosa* Gould, which may be *nigripes* Aud., and my *D. leptorhyncha*.

** As just stated, the three recognized species of *Pelecanoides* require additional evidence to prove conclusively that they are not merely the extremes of a single variable species.

Pp. 80, 81, 90. There can be no doubt of the propriety of referring *P. lugubris* Natterer, and *P. melitensis* Schembri, to *pelagica* L. *Proc. tethys* Bp., also seems hardly distinct.

Pp. 81, 90. *Thalassidroma fasciolata* Tschudi has been recognized by other writers as valid.

Pp. 84, 91. *Oceanites segethi* ex Ph. et Ldbk. is undoubtedly a synonym of *O. gracilis* ex Elliot, as intimated in my paper.

Pp. 87, 91. *Fregetta Lawrencii* Bp. is probably a synonym of *grallaria* Bp. ex Vieill. as Mr. Lawrence himself originally believed. The point cannot now, however, be positively determined, as the specimen is lost.

Pp. 88. 91. Bonaparte's identification of Linnæus' *Proc. fregata*, which I followed, is by no means proven; and in view of the uncertainty attaching to Linnæus' diagnosis (which may refer to some species of the genus *Fregetta*) it may be as well to take our specific name from Latham's unequivocal indication of *P. marina;* calling the species *Pelagodroma marina* after Reichenbach.

Puffinæ.

Pp. 122, 142, 143. Genera "*Thiellus*" and "*Nectris.*" The points in which these groups differ from *Puffinus* proper, are exceedingly trivial, as I state in my paper. I am now indisposed to retain them, even on the plea of utility, and would accordingly unite all their species under *Puffinus.*

Pp. 119, 141. *Adamastor* Bp. According to Mr. G. R. Gray the type of the genus *Priofinus* of Hombron and Jacquinot is based upon the bird Bonaparte calls *Adam. typus*, and it has priority over Bonaparte's designation. If this be the case the three species should stand as *Priof. cinereus*, *Priof. gelidus* and *Priof. sericeus.*

Pp. 118, 141. *Majaqueus* Reich. If *Proc. Parkinsoni* Gray, (Ibis 1864) is a valid species, it may belong to this genus rather than to the fuliginous group of *Æstrelata* under which I have considered it. Additional data concerning it are greatly to be desired.

P. 121. Add *Daption gelidum* Steph. Shaw's Gen. Zool. xiii. p. 245, to synonyms of *Adamastor gelidus.*

P. 123. *Puffinus fuliginosus.* I have received specimens from the Pacific coast of North America which I cannot distinguish from the common Atlantic bird. It is quite different from the species I have named *Puffinus amauriso-ma*, p. 124. By a misapprehension of a remark of Dr. Kuhl, I erroneously state that *fuliginosa* Forst., Descr. sp. 18, is a species of *Nectris;* whereas I am now satisfied it is the same as Kuhl's sp. 12, which is the *Pterodroma atlantica* of Bonaparte. Compare my remarks under *Æstrelata fuliginosa* in part iv. of these papers. Kuhl's *fuliginosa* sp. 27, after Banks' tab. 23, is identified by Mr. Gray with *pacifica* Lath.

P. 126. *N. carneipes.* On the authority of Dr. Schlegel I placed *cinereus* juv. Smith, and *gama* Bp. as synonyms of this species. Mr. Gray considers them as referring to a species of *Nectris* or rather *Puffinus* not recognized in my paper, viz.: *P. tristis* Forst. I am entirely unacquainted with this bird, if it be a valid species. Bonaparte and Schlegel make it the same as *tenuirostris* Temm.

Pp. 131, 144. A second specimen of *Puffinus creatopus* has been received from the same locality.

Pp. 141, 144. *Procellaria nugax* Sol. This unpublished specific name should not take precedence over *assimilis* of Gould.

Fulmarei.

Add *Fulmarus antarcticus* Steph. Shaw's Gen. Zool. 1825, xiii. p. 236, to the synomyms of *Thalassoica glacialoides.*

Add *Daption antarcticum* op. cit. p. 242, to synonyms of *Thalassoica antarctica.*

[May,

BIBLIOGRAPHICAL APPENDIX.

It may be well to give in this connection a synopsis of the works of some of the older authors, as far as they relate to the subject in hand. The earlier authorities to be particularly consulted in a study of the *Procellariidæ** are the following:—

LINNÆUS, *Syst. Nat. ed.* 10 (1758.)

In this edition, the first in which species are presented, there are named (p. 131) three species; sc. *pelagica*, (type of genus *Procellaria;*) *æquinoctialis* and *capensis*.

LINNÆUS, *Syst. Nat. ed.* 12, vol. i. (1766.)

1. *Proc. pelagica*, p. 212.

2. *Proc. fregata*, p. 212. I followed Bonaparte's authority in referring this name to the species subsequently named *marina* by Latham; but there seems to be nothing in the Linnæan diagnosis requiring this identification; the name being very probably based upon some species of the genus *Fregetta* as now restricted.

3. *Proc. glacialis*, p. 213, = *Fulmarus glacialis* Leach.

4. *Proc. æquinoctialis*, p. 213, = *Majaqueus æquinoctialis* Reich.

5. *Proc. capensis*, p. 213, = *Daption capensis* Steph.

6. *Proc. puffinus*, p. 213,= probably *P. anglorum* (Ray,) Temm. Has been identified also with *P. Kuhlii* Boie, and *P. major* Fab., and almost every other Atlantic *Puffinus*.

GMELIN, *ed. Linn. Syst. Nat.* vol. i. part. ii. (1788.)

7. *Proc. obscura*, p. 559. One of the smaller *Puffini*, the habitat of which is given as "insula nativitatis Christi." Now universally applied to the common bird of the Atlantic, called *obscura* by Vieillot, Nouv. Dict. p. 423, in 1817.

8. *Proc. pacifica*, p. 560. Not identified with any other known species. A large *Puffinus*, from the island of Euopoa.

9. *Proc. cærulea*, p. 560, = *Halobæna cærulea* Bp.

10. *Proc. vittatus*, p. 560, = *Prion vittata* Lacép.

11. *Proc. urinatrix*, p. 560, = *Pelecanoides urinatrix* Lacép.

1. *Proc. pelagica*, p. 561. Variety B. is probably fictitious.

2. *Proc. fregata*, p. 561. Same as that of Linnæus.

12. *Proc. furcata*, p. 561, = *Oceanodroma furcata* Reich.

13. *Proc. fuliginosa*, p. 562. Based upon Latham's species of this name, and not yet identified. A small species, eleven inches long, with a forked tail; from Otaheite. Generally supposed to be a species of *Thalassidroma*.

14. *Proc. desolata*, p. 562. Now recognized as a valid species of *Æstrelata*.

15. *Proc. nivea*, p. 562, = *Pagodroma nivea* Bp.

16. *Proc. melanopus*, p. 562. Not identifiable, except opinionatively. Evidently some species of *Æstrelata*. Said to come from North America, which would make it referrible to *Æ. hæsitata*. Description applies in most respects to *mollis* Gould.

3. *Proc. glacialis*, p. 562, = *Fulmarus glacialis* Leach. The var. B. is the *Thalassoica glacialoides* (Smith) Reich.

*The indications of the *Diomedeinæ* are generally so definite that the consideration of them may be here omitted.

17. *Proc. cinerea*, p. 563. A stumbling block, concerning which authors are greatly at variance. Usually employed by European authors as the name of the species I describe as *Puffinus Kuhlii* Boie; and applied by American writers to *P. major* Fab. By Bonaparte identified with his *Adamastor typus* (= *hæsitata* Forst. Gould, Reich. nec Kuhl, Temm. = *Adamastor cinereus* of my paper.) in which opinion I entirely concur. According to Mr. Gray, the genus *Priofinus* Homb. et Jacq. is based upon this same bird, and antedates *Adamastor* of Bonaparte. The proper name of the species in question would then be *Priofinus cinereus*.

18. *Proc. gigantea*, p. 563, = *Ossifraga gigantea* Reich.

19. *Proc. brasiliana* p. 564. Very dubious. May be the same as the preceding species; or the *Graculus brasilianus*, as identified by Bonaparte.

4. *Proc. æquinoctialis*, p. 564, and var. B., = *Majaqueus æquinoctialis* Reich.

20. *Proc. grisea*, p. 564. Unidentifiable.

21. *Proc. gelida*, p. 564. I think that this name was based upon the species subsequently named *flavirostris* by Mr. Gould, the proper name of which appears to be *Priofinus gelidus*.

22. *Proc. alba*, p. 565. Evidently a species of *Æstrelata*, and probably some one of the plumages of *Æ. Lessoni*.

LATHAM, *Index Ornithologicus*, ii. (1790.)

Of Dr. Latham's three principal works this is the one usually referred to, as being the only one in which Latin binomial names are used. Most of the species given in this work have exactly the same import as those of Gmelin, and need not therefore be noticed. The following are the chief points requiring attention :—

6. *Proc. alba*, var. B., p. 822.—"Norfolk Island Petrel." A species subsequently named *Proc. Phillippi* by Gray, with which *P. mollis* Gould is considered as probably synonymous.

18. *Proc. marina*, p. 826.—First definite characterization of the type of the genus *Pelagodroma* (*Pel. fregata* Bp. *Pel. marina*, Reich.)

21. *Proc. Forsteri*, p. 827, = *Proc. vittata* Gm.

23. *Proc. pacifica* p. 827. Same as that of Gmelin. The name is unidentifiable, unless we regard it as expressive of a valid species. By Mr. Gray it is so considered (Cat. Birds Pac. Isl.) and the following cited as synonymous: *Nectris fuliginosus* (Sol.) Banks, ic. 23.—*Proc. fuliginosa* Kuhl, sp. 27; (but *not* Kuhl's sp. 12!) *Puff. pacificus* Gray, Gen. Birds, p. 647. It is a large *Puffinus*, 22 inches long, with flesh-colored bill and feet; from Euopoa.

24. *Proc. obscura*, p. 828, = that of Gmelin. By Mr. Gray this name is considered the same as that of Vieillot, (Nouv. Dict. xxv. p. 423, and Gal. Ois. tab. 301;) and is made to include the Australian form (figured by Mr. Gould, pl. 59 of the B. Aust. and named by him *assimilis*,) which is considered distinct by the majority of writers.

VIEILLOT, *Nouv. Dict. d'Hist. Nat.* xxv. (1817.)

The article "Petrel" of this work is in general a close copy of Gmelin and Latham. Certain points, however, may be noticed.

Proc. pelagica, p. 416. Mentions under this head the "Petrel échasse" of Temminck.

Proc. grallaria, Vieill. p. 418. First name of the species subsequently named *leucogaster* by Gould; unless as is possibly the case *fregata* of Linnæus be this species rather than the *Pelagodroma marina*.

Proc. fuliginosa, p. 418. Latham's Otaheite species, whatever that may be.

Proc. grisea, p. 419. Unidentified. = that of Gm. and Lath.

Proc. alba, p. 419. Mentions under this head the "Norfolk Island Petrel," subsequently named *P. Phillippii* by G. R. Gray.

Proc. puffinus, p. 421, = *Puff. anglorum*. Cites Pl. Enl. 962. The "*Proc. puffinus* var. Lath. Pl. Enl. No. 39" may refer to *Puffinus Kuhlii* Boie.

Proc. pacifica, p. 422. "Se trouve en Europe" by error for "Euopoa."

Proc. æquinoxialis, p. 422. Refers as a variety of this species to the "Kurile Petrel" of Latham and Pennant, from Kamtschatca; a bird now generally supposed to be some species of *Nectris;* which latter identification requires confirmation.

Proc. leucorhoa, Vieill. p. 422. First designation of the *Thalassidroma Leachii* Temm.

Proc. obscura, p. 423. Is this the same as Gmelin's species? This reference to Vieillot should rather be cited for the name of the common small Atlantic *Puffinus*.

HEINRICH KUHL, *Beit. Zool. u. Vergl. Anat.* (1820.)

In this work there is presented a "Beiträge zur Kenntniss der Procellariden" which is a very important contribution to the bibliography of the family, marking perhaps the first decided advance over the writers of the eighteenth century. The following species are given in this monograph:

1. *Proc. furcata* "L." p. 136. = *Oceanodroma furcata* Reich.

2. *Proc. oceanica* "Banks," p. 136. = *Thalassidroma Wilsoni* (*P. pelagica* Wils.) of most ornithologists, now *Oceanites oceanica* mihi.

3. *Proc. marina* "Lath." p. 137. = *Pelagodroma fregata* Bp. and of my paper; *Pelag. marina* Reich.

4. *Proc. Leachii* "Temm." p. 137. = *P. leucorrhoa* Vieill. = *Cymochorea leucorrhoa* Coues.

5. *Proc. fregatta* "Banks," p. 138. = *P. grallaria* Vieill. nec Licht, (= *leucogaster* Gould.)

6. *Proc. pelagina*, p. 139. = *P. pelagica* Linn.

7. *Proc. glacialis*, p. 139. = *Fulmarus glacialis* Leach.

8. *Proc. capensis*, p. 140. = *Daption capensis* Steph.

9. *Proc. gigantea*, p. 140. = *Ossifraga gigantea* Reich.

10. *Proc. æquinoctialis*, p. 141. = *Majaqueus æquinoctialis* Reich.

11. *Proc. hasitata* "Forst." p. 142. But not of Forster. Kuhl's *hasitata* is the same as that of Temminck, Pl. Col. 416, which is an *Æstrelata*. (*Æst. diabolica* Bp. = *Æst. hæsitata* of my paper.)

12. *Proc. fuliginosa*, p. 142. = *fuliginosa* Forst. nec auct. = *Proc. atlantica* Gould. = *Pterodroma atlantica* Bp. = *Æstrelata fuliginosa* Mihi.

13. *Proc. desolata*, p. 143. = *Æstrelata desolata* Bp.

14. *Proc. turtur*, "Banks," p. 143.—I prefer Mr. Gould's identification of this species to that of Dr. Schlegel. See remarks in my paper on *Prioneæ*.

15. *Proc. grisea* "L." (Gm.) p. 144.—Not of Gm. Lath. Examine Dr. Schlegel's identification of this species; which I follow.

16. *Proc. cærulea* "Forst." p. 145. The *cærulea* of Gmelin, which Forster calls "*similis*."

17. *Proc. urinatrix* "Forst." p. 145. The urinatrix of Gm. now *Pelecanoides urinatrix*, which Forster calls *Proc. tridatyla*.

18. *Proc. nivea*, p. 145. = *Pagodroma nivea* Bp.

19. *Proc. antarctica* p. 145. = *Thalassoica antarctica*.

20. *Proc. lugens* "Forst." p. 145. Not positively identifiable. Dr. Kuhl

says that he "thinks it is *P. grisea* L." which, according to his use of this name, would make it the species described in my paper upon Dr. Schlegel's authority as *Æstrelata grisea*.

21. *Proc.* ——— "Forst. tab. 20," p. 145. An undetermined species.

22. *Proc. puffinus*, p. 146. = *Puffinus major* Fab.

23. *Proc. anglorum*, p. 146. = *Puffinus anglorum* Temm.

24. *Proc. obscurus*, p. 147. = Vieillot's species.

25. *Proc. cinerea*, "L." p. 148. Not of Linnæus or Gmelin; but the *Puffinus Kuhlii* Boie.

26. *Proc. munda* "Banks, tab. 24," p. 148. = Quid?

27. *Proc. fuliginosa* "Banks tab. 23," p. 148. Quite a different bird from Kuhl's sp. 12. Unidentifiable by the description. By G. R. Gray identified with *Proc. pacifica* Lath., whatever that species may be!

28. *Proc. vittata* p. 149. = *Prion vittatus* Lacép.

STEPHENS, *Continuation of Shaw's General Zoology*, xiii. (1825.)

This work closely adheres to Gmelin's and Latham's authority. A few points may profitably be examined.

Proc. oceanica, p. 223. Not the *Oceanites oceanica* (*Thalassidroma Wilsoni*) but a species of *Fregetta*, probably *F. grallaria*. Author refers to Forster; to Pl. Enl. 993; to Temm. Man. p. 520; and to Bp. Journ. Acad. Phila. v. iii. p. 8. On the followiug page (p. 224) "*Proc. Wilsoni*" is presented.

Puff. cinereus, p. 227. The synonyms adduced are chiefly those of *Adamastor cinereus*; description applies either to this latter or to *Puffinus Kuhlii* Boie; the description of the young would do for *Puffinus major* Fab.

Puff. æquinoctialis, p. 229. Cites *Proc. pacifica* Lath. as a queried synonym.

Puff. obscurus, p. 230, is Gmelin's species.

Genus *Fulmarus* instituted, p. 233.

Fulmarus antarcticus, Steph. p. 236, is based upon *Proc. glacialis* var. B. Lath. Ind. Orn. ii. p. 823, (= Var. A. sp. 9, p. 405, of Lath. Gen. Syn.) which is the *Thalassoica glacialoides*. This synonym of the species was accidently omitted in my paper on the *Fulmareæ*, and the omission not discovered until too late.

Genus *Daption* instituted, p. 239, with *capensis* as type. The author "ventures to attach the numerous Southern Petrels described by Latham thereto," producing a heterogeneous assemblage in which figure *antarctica*, *nivea*, *desolata*, *gelida*, *grisea*, (of Linn. nec Kuhl, Schl.) *alba*, and *fuliginosa* (= Latham's Otaheité species.)

Genus *Pachyptila* "Ill." adopted; under it are arranged, besides its type *vittata* (here called "*Forsteri*") *cærulea* Gm., *marina* Lath., *fregata* Linn. and *furcata* Gm., nearly all of which are typical of distinct genera.

JOAN. REIN. FORSTER, *Descr. Anim. etc. curante* HENR. LICHTENSTEIN. (1844.)

The numerous species described and named by Forster have an important bearing upon the bibliography of the Family. It is greatly to be regretted that they were only published at a comparatively recent date: and that his figures still remain inedited. Forster appears to have had very little regard for priority in the matter of names; but his descriptions are in the main so excellent, that nearly all his species are identifiable. The following is a list of the species given by him:

Proc. capensis, p. 20.

Proc. vittata, p. 21.

Proc. fuliginosa, p. 23. = *Proc. atlantica* Gould. = *Pterodroma atlantica* Bp. = *Æstrelata fuliginosa* of my paper. Not of Gm. Lath. Vieill. Not of Strickland. Equals Kuhl's sp. 12; but not his sp. 27.

Proc. puffinus, p. 23. Not of Linn. Gm. Lath. Some large Southern *Puffinus* possibly the true *P. major*, Fab.

Proc. glaicalis, p. 25. Not of L. Gm. Lath.; but the *Thalassoica glacialoides* (Smith) Reich.

Proc. nigra, p. 26, = *æquinoctialis* L.

Proc. nivea, p. 58.

Proc. similis, p. 59. = *Halobæna cærulea*, Bp. ex Gm.

Proc. antarctica, pp. 60 and 202.

Proc. gavia, p. 148. Not subsequently identified with any known species. By Gray regarded as a valid species; and so given in these papers.

Proc. tridactyla, p. 149. = *Pelecanoides urinatrix* Lacèp. ex Gm.

Proc. fregata, p. 180. The *grallaria* of Lichtenstein; not of Vieillot. Probably the species subsequently named *melanogaster* by Gould.

Proc. inexpectata, p. 204. A somewhat doubtful species, coming nearest to *mollis* Gould, with which I have identified it.

Proc. tristis, p. 205. ("Pr. fuliginosa, rostro fusco, pedibus anticé glaucis; $17\frac{1}{2} \times 38$; bill 2; its width $\frac{1}{2}$; its depth $\frac{3}{4}$.") A southern fuliginous *Puffinus*, not identified with any known species. Mr. G. R. Gray (Ibis, 1862, p. 244) considers it as a valid species, and assigns the following synonymy: *Proc. grisea* Forst. ic. ined. 94; (nec Gm.) *Puff. major*, Gray, Ereb. and Terr. (nec Fab.) *P. fuliginosus* Homb. and Jacq. Voy. Pôle. Sud. tab. 32, fig. 7. (nec Strickl.) *Puf. cinereus* A. Smith, Ill. S. Afr. Bds. (nec Gm. nec Auct.) *Nectris gama*, Bonap.

Proc. leucocephala, p. 206. = *Proc. Lessonii* Garn. (*Æstrelata Lessoni* Cass.)

Proc. hæsitata, p. 208. = *P. cinereus*, Gm. Lath. Vieill. Lawr. = *Adamastor typus* Bp. = *Adam. ciner.* or *Priofinus ciner.* Coues. = *Proc. Adamastor* Schlegel, etc. etc. The *hæsitata* of Gould and Reichenbach, but not of Kuhl and Temminck, which is an *Æstrelata*.

Proc. ossifraga, p. 343. = *gigantea* Gm.

In bringing to a close the present series of papers, the author is deeply sensible of their many defects; and can only crave for them a lenient judgment in view of the very difficult nature of the task he attempted, and has throughout conducted, with the sole desire of elucidating truth. Should the undertaking prove a failure, and the meagre results incommensurate with the time and labor bestowed,—at least it may be said of him, "—— si non tenuit, magnis tamen excidit ausis."

Observations upon the Cranial Forms of the American Aborigines, based upon Specimens contained in the Collection of the Academy of Natural Sciences of Philadelphia.

BY J. AITKEN MEIGS, M. D.

The early record of every science abounds in crude facts, imperfect observations, and, consequently, in generalizations so hastily formed as to partake more of the character of mere speculation than of strictly logical deduction. These erroneous statements and premature generalizations are at first generally accepted as scientific truths. A few cautious observers, it is true, may withhold from them their assent, but their opinions find no support beyond themselves, until these facts and hypotheses come in conflict with others better known and better established, or, are employed in developing still higher and more comprehensive theories. Then, for the first time, they are subjected to a rigid investigation, and their true value, at length, ascertained. Nowhere can we find a more instructive example of this assertion than in the doctrine which ascribes to the American aborigines a homogeneous cranial type. For the philosophical ethnologist this doctrine is full of interest. If the

physical, and more especially the cranial, characteristics of the native races of the New World are at once common and peculiar to them, it is strong, presumptive evidence that they are isolated or distinct from the rest of mankind in origin. If, on the contrary, it can be shown that the skulls of these people really belong to different, well-marked types or forms, which, if not identical with, are, at least, the homoiocephalic representatives of those of the Eastern Hemisphere, it becomes very probable that there is for the American variety of man neither unity nor genetic isolation. The discussion of the origin and affiliations of this widely spread race has an important bearing upon the higher and more complex question of the unity of the entire human family. As this discussion involves, among other facts, the consideration of the osteological characters of the aboriginal American, it becomes very important to determine with exactitude the typical, cranial form or forms of this race.

The extraordinary doctrine of a uniform American type of skull originated, as is well known, with the late Dr. Samuel George Morton. He was also the most enthusiastic and persistent advocate of this scientific dogma. A variety of circumstances combined to give unusual acceptance to his views. He began his craniographic researches two years after the completion of Blumenbach's *Decades Craniorum*, by accumulating what was then, as far as I can learn, the largest and most diversified collection of human skulls in the world. These he long and attentively studied, until he acquired the right to speak authoritatively concerning them. No one was in possession of so many native American crania as he, and so little interest was manifested in human craniography at that time, that but few if any persons ever examined his collection with the object of testing the validity of his conclusions. Moreover, prior to the publication of *Crania Americana*, Dr. Morton had already acquired the double reputation of a naturalist and a physician, and for several years before his death occupied the most prominent, official position in the Academy of Natural Sciences. In view of these facts, it is not at all surprising that his opinions, instead of being controverted, as they now are, found ready adherents ; and that one of the most eminent of living naturalists should have employed them, as well established facts, in his attempt "to show that the boundaries, within which the different natural combinations of animals are known to be circumscribed upon the surface of our earth, coincide with the natural range of distinct types of man."*

In 1856, while preparing for publication an article on the cranial characteristics of the various races of men† I especially directed my attention to those groups of crania in the Academy's collection which had not been described by Dr. Morton. With regard to American and Egyptian skulls, which he had so long and so carefully studied, I contented myself with reproducing the conclusions which he had already published, my object being to exhibit in general panoramic review the skull-forms of the human family. In the concluding remarks of that article I observed that just as "the Kalmuck or true Mongolian, the Tartar, Chinese, Japanese and Turkish types of skull are all, to a certain extent, related, and yet are all readily distinguishable from each other, and as each of these groups again presents several cranial varieties ; so, among the barbarous aborigines of North America, notwithstanding the general osteologic assimilation of their crania, important tribal distinctions can be readily pointed out." I also remarked: "It is a general and very well known fact—first noticed by Buffon—that the fauna and flora of the Old World are not specifically identical with the fauna and flora of the New. Their relationship is manifested in an interesting system of representation, or as Schouw expresses it, of geographical repetition according to climate. To a certain extent, human cranial forms appear also to fall within the limits

* Sketch of the Natural Provinces of the Animal World and their relation to the different Types of Man. By Louis Agassiz. See Types of Mankind, p. lviii.
† Indigenous Races of the Earth, p. 203.

f this system. As far as my own opportunities for examination have gone, have not been able to find a single aboriginal American type of skull which, ı all its essential details, could be regarded as strictly identical with any in urope, Asia, Africa or Australia." "The massive, heavy skulls of northern emperate Asia and Europe are represented in America by those of the Barbarous tribes—decidedly different, but allied forms. So the comparatively mall-headed Peruvians represent the equally small-headed Hindoos."*

In 1859, while attempting to determine the ethnic type of a singularly deormed skull from Jerusalem,† by comparing it with other crania, I noticed, or the first time, how much the form of the occiput differed in the various ribes of Indians. I also observed that "upon our side of the Atlantic the wedish crania find their representatives in the Arickaree Indian skulls." ubsequently, in another paper, published in the *Proceedings of the Academy*,‡ I ndeavored to show that the conformation of the occiput varied as much among ıe aboriginal American races as among the natives of the Old World. I propose now to demonstrate that this diversity is not confined to the occipital reion only, but is exhibited by the skull as a whole. Before, however, interrogaing upon this point the magnificent collection which science owes to the untirng industry and sagacity of Dr. Morton, it becomes necessary to inquire for moment how this eminent craniographer was led to adopt the singular conlusions which he has given to the world in *Crania Americana* and subseuent publications.

It is well known that, with few but important exceptions, the earlier travllers who visited the New World, and certain historians also, speak decidedy of the general resemblance which pervades the aboriginal American tribes. 'heir uniformity of aspect, customs, &c., led Herrera to assign to them a comnon origin§. "Whoever," said Don Antonio Ulloa, "has seen an Indian of vhatever region may say that he has seen them all."‖ Bernard Romans was firmly of the opinion that God created an original man and woman in America of different species from any in other parts of the earth."¶ Robertson leclared that all the inhabitants of America, except the Esquimaux, "must ıe pronounced to be descended from one source."** Malte Brun thought 'that the Americans, whatever their origin may be, constitute, in the present lay, by their physical characters, not less than by their peculiar idiom, a race ssentially different from the rest of mankind."†† In conformity with this iew he placed them alone in the last of the sixteen races into which he dirided the whole human family. Linnæus,‡‡ Gmelin,§§ Herder,‖‖ Kant,¶¶ Buffon,*** Hunter,††† Blumenbach,‡‡‡ Lawrence,§§§ Dumeril‖‖‖ and other writers, in their attempts at the classification of the races of men, have uni-

* Ibid. pp. 351, 352.

† Description of a Deformed Fragmentary Human Skull, found in an ancient Quarry-Cave at Jerusalem. Proc. Acad. Nat Sci., Sept, 1859, p. 262.

‡ Observations upon the Form of the Occiput in the various Races of Men, Proc. Acad. Nat. Sci., Sept. 1860, p. 397.

§ Historia de las Indias.

‖ "Visto un Indio de qualquier region, se puede decir que se han visto todos en quanto al color y contextura." Noticias Americanas; entretenimientos físico-historicos sobre la América meridional, y la septentrional oriental, etc. Su Autor el Exc. Sr. Don Antonio de Ulloa. Madrid, 1792, p. 253.

¶ A concise Natural History of East and West Florida. New York, 1776, p. 38.

** History of America. London, 1803, vol. 2, p. 46.

†† Universal Geography. Boston, 1826, vol. v. p. 12.

‡‡ Systema Natura, ed. 12 et 13, Homo. English translation by Robt. Karr, London, 1792, p. 4o.

§§ Ibid. p. 46.

‖‖ Zur Philosophie der Geschichte der Menschheit, II. S. 4, 68.

¶¶ Engel's Philosophie für die Welt, ii.

*** Œuvres complètes de Buffon. Paris, 1774, t. v.

††† Disputatio Inauguralis quædam de Hominum varietatibus, etc. Edinburgi, 1775, p. 9.

‡‡‡ De Generis Humani Varietate Nativa. Gœttingæ. 1795, p. 286

§§§ Lectures on Comparative Anatomy, Physiology, Zoology and the Natural History of Man. London, 1848, Bohn's Edition, p. 247.

‖‖‖ Zoologie Analytique. Paris, 1806, p. 7.

formly assigned the American family to a separate group or class. Others again, like Zimmerman,* Virey,† Humboldt,‡ Garnot.§ and various authorities of a still more recent date, associate the aboriginal Americans with the Mongols or other Asiatics. It is an interesting fact that Cuvier‖ recognized three distinct races of man, into neither of which, however, did he place the Americans, but left them unclassified.

The statements of the earlier investigators—those of the sixteenth and seventeenth centuries—concerning the similarity of physical characters exhibited by the different sections of the American race, harmonize remarkably with the results of the laborious and protracted researches of different eminent philologists. As early as 1798, Dr. Barton endeavored to show "that in all the vast countries of America, there is but one language."¶ In 1810, the celebrated philologue, Vater, to whom had been committed the completion of Adelung's *Mithridates*, or *Allgemeine Sprachenkunde* showed that the general internal or grammatical structure of the American languages was the same for all.** Humboldt, in his *Personal Narrative*, testified to the same remarkable phenomenon.†† Du Ponceau characterized the peculiar, complicated grammar of the American idioms from Greenland to Cape Horn by the term polysynthetic.‡‡ Still later, Gallatin affirmed that all the languages of the native inhabitants of America from the Arctic Ocean to Cape Horn, have, as far as they have been investigated, a distinct character common to all, and apparently differing from any of those of the other continent with which we are most familiar.§§

While these and other observers were thus surveying the American Races from a philological standpoint, the late Dr. Morton was industriously engaged in collecting the materials necessary to illustrate their osteology, and at the same time the distinguished French naturalist, M. Alcide D'Orbigny was travelling in South America and studying the natives, not with the unpractised and superficial eye of the curious traveller, but with that of the closely observant and discriminating anatomist.

The remarkably discrepant ethnological results of the labors of these eminent naturalists were given to the world at the same time. The *Crania Americana* and *L'Homme Américain* both appeared in the year 1839. In the former work, Dr. Morton, speaking of the native Americans, declared that "it may be assumed as a fact that no other race of men maintains such a striking analogy through all its subdivisions, and amidst all its variety of physical circumstances."‖‖ In a later publication he asserted that "the peculiar physiognomy of the Indian is as undeviatingly characteristic as that of the Negro; for whether we see him in the athletic Charib or the stunted Chayma, in the dark Californian or the fair Borroa. he is an Indian still, and cannot be mistaken for a being of any other race."¶¶ On the other hand, M. D'Orbigny affirmed, with equal emphasis, that "a Peruvian is more different from a Patagonian, and a Patagonian from a Guarani than is a Greek from an Ethio-

* Zoologie Geographique, Cassel, 1784. L'Homme.

† Histoire naturelle du Genre Humain, Paris, 1824, t. i. p. 480.

‡ Personal Narrative of Travels to the Equinoctial Regions of America. London, 1852, vol. i. p. 325.

§ Dictionnaire d'histoire naturelle. L'Homme.

‖ Le Regne Animal. p. 103.

¶ New Views of the Origin of the Tribes and Nations of America. By Benjamin Smith Barton, M. D., Phila., 1798, p. lxxv.

** Untersuchung über Amerikas Bevölkerung aus dem alten Continente. Leipzig, 1810. Mithridates, 3 Th. 2 Abth. p. 340. See also Wiseman's Twelve Lectures on the Connection between Science and Revealed Religion, London, 1842, p. 80.

†† Bohn's Edition, vol. i. p. 313.

‡‡ Transactions of the American Philosophical Society. Vol. 1, New Series, 1818, p. xl.; vol. 3, pp. 76, 77.

§§ Archæologia Americana. vol. 2, pp. 5, 118.

‖‖ P. 63.

¶¶ An Inquiry into the Distinctive Characteristics of the Aboriginal Race of America, 2d edit. Philada., 1844, p. 5.

pian or a Mongolian."* This language sounds like the echo of the words of Molina and of Humboldt. "I laugh in my sleeve," said the former, "when I read in certain modern writers, supposed to be diligent observers, that all the Americans have the same appearance, and that when a man has seen one, he may say that he has seen them all." "A Chilian does not differ less in aspect from a Peruvian, than an Italian from a German. I have seen myself Paraguaynos, Cujanos and Magellanos, all of whom have their peculiar lineaments which are easily distinguished from those of the others."† And Humboldt, too, an eye witness like Molina and D'Orbigny, tells us "that those Europeans who have sailed on the great rivers Orinoco and Amazon, and have had occasion to see a great number of tribes assembled under the monastical hierarchy in the missions, must have observed that the American race contains nations whose features differ as essentially from one another, as the numerous varieties of the race of Caucasus, the Circassians, Moors and Persians, differ from one another." "What a difference between the figure, physiognomy, and physical constitution of the tall Charibs, who ought to be accounted one of the most robust nations on the face of the earth, and the squat bodies of the Chayma Indians of the province of Cumana. What a difference of form between the Indians of Tlascala and the Lipans and the Chichimecs of the northern part of Mexico."‡

Blumenbach recorded his conviction that "in the American variety of mankind, as in others, countenances of all sorts occur."§ Both Lawrence‖ and Prichard, also distinctly recognized the differences exhibited by the aboriginal Americans.

"Perhaps the degree of resemblance to a common type subsisting between the nations of America," says Prichard, "may admit of comparison with that which is to be traced between the different nations of Europe or among the races of Africa, or those of the northeastern parts of Asia. It is not universally prevalent in the same degree, but there appears to be in every instance some approximation to it; yet there can be no doubt that the resemblance has been in general much exaggerated. It will be easy to prove that the American races, instead of displaying an uniformity of color in all climates, show nearly as great a variety in this respect as the nations of the old continent; that there are among them white races with a florid complexion inhabiting temperate regions, and tribes black or of very dark hue in low and intertropical countries, that their stature, figure and countenances are almost equally diversified." "The nations of South America have in general flatter faces, and many of them a shorter and broader shape of body than the North Americans. In these respects the southern people are more like the Turanian nations than the northern tribes."¶

In another work he remarks: "Anatomists have distinguished what they termed the American form of the human skull; they were led into this mistake by regarding the strongly marked characteristics of some particular tribes as universal. The American nations are spread over a vast space, and live in different climates, and the shape of their heads is different in different parts."**

According to Dr. Barton, a writer named Postel "is said to have been the first 'who made such a difference between the two Americas, by means of the Isthmus of Panama, that the inhabitants of those two continents have no-

*L'Homme Américain (de l'Amérique Méridionale), considéré sous ses rapports physiologique et moraux. Paris, 1839. t. 1, p. 123.

†Saggio Sulla Storia Naturale del Chili. Bologna, 1810. p. 336.

‡Political Essay on the Kingdom of New Spain. New York, 1811, vol. 1. p. 107.

§De Generis Humani Varietate Nativa, Edit. Tertia, Gottingæ, 1795, p. 316. See also the Anthropological Treatises of Johann Friedrich Blumenbach, translated by Thos. Bendyshe, London, 1865, p. 273.

‖Op. cit. pp. 221, 223, 224, 247 and 248.

¶Researches into the Physical History of Mankind, 4th Edit, London, 1841, vol. 1, p. 269.

**The Natural History of Man, 4th Edition, London, 1855, vol. 2, p. 495.

thing common in their origin.' "* The Abbe Clavigero entertained a similar idea.†

Such, in brief terms, were the conflicting statements promulgated by different writers prior to the publication of *Crania Americana*. With all these Dr. Morton was thoroughly conversant. Through Cardan he knew that the skulls of the inhabitants of the old Portus Provinciæ were square and deficient in the occiput, that Charlevoix described the heads of one of the Indian nations of Canada as globular, and those of another as flat;‡ that De Pauw speaks of certain Indians on the borders of the Maragnon having square or cubical heads,§ and that Malte Brun described the aboriginal Americans as having, among other characters, "heads of a square shape, with the occipital bone not so convex, and the facial line more inclined than among the Mongol race."‖ He knew that Humboldt had declared in his *Researches* "that the nations of America, except those which border on the polar circle, form a single race characterized by the formation of the skull," &c.¶ He was familiar also with the statements of Von Spix and Martius that the Brazilians resembled the Chinese in possessing, among other physical characters, "a small, not oblong, but roundish, angular, rather pointed head, with a broad crown, prominent sinus frontales, low forehead, and pointed and prominent cheek-bones."** He was also acquainted with the fact that both Desmoulins and Bory de St. Vincent ascribed to a number of the American races a spherical head as a prominent characteristic. Among the earlier specimens added to his subsequently famous cranial collection, were some brachycephalic skulls, with truncated or more or less vertically flattened occiputs.†† These, together with the numerous short-headed Peruvian crania in his cabinet, presented such a striking contrast with the ordinary elongated head-forms of the human family in general, that he was hastily led to regard the short, round or angular skull with flat occiput and depressed forehead, as the typical cranial form of the aboriginal Americans. This form he probably regarded as the osteological analogue to the holophrastic or polysynthetic character which the philologist had already declared to be at once common and peculiar to the American races.

Dr. Morton divided the American race into two great families—the Toltecan and the Barbarous Tribes. The latter he subdivided into the Appalachian, Brazilian, Patagonian and Fuegian branches. To the Appalachians he ascribed a rounded head; large, salient and aquiline nose; dark brown eyes, with little or no obliquity of position; large and straight mouth; nearly vertical teeth and triangular face. They included all the nations of North America excepting the Mexicans, together with the tribes north of the river Amazon, and east of the Andes. The Brazilian branch, located between the rivers Amazon and La Plata, and between the Andes and the Atlantic, embraced the whole of Brazil and Paraguay north of the 35th degree of south latitude. The Patagonian branch included the nations south of the La Plata to the Straits of Magellan and the mountain tribes of Chili. The Fuegian branch comprised the people who inhabit the island of Terra del Fuego, often called Patagonians. The Esquimau or Polar Tribes, Dr. Morton separated entirely from the American race, and designated them "Mongol Americans."

With regard to the aboriginal American crania, Dr. Morton tells us that "after examining a great number of skulls, he found that the nations east of

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* Charlevoix's Voyage to North America; Preliminary Discourse, p. 3. See Barton's New Views, p. xcvi.

† History of Mexico, vol. 2, p. 215.

‡ The Anthropological Treatises of Blumenbach, London, 1865, p. 121.

§ Recherches philosophiques sur les Américains, Berlin, 1777, t. 1, p. 122.

‖ Op. cit. pp. 12, 13.

¶ Researches concerning the Institutions and Monuments of the Ancient Inhabitants of America. London, 1814. Vol. 1. p. 14.

** Reise in Brasilien. München, 1823, 1r Th. S. 184.

†† See the 1st Edition of his Catalogue of Skulls.

the Alleghany Mountains, together with the cognate tribes, have the head more elongated than any other Americans. This remark applies especially to the great Lenapé stock, the Iroquois and the Cherokees. To the west of the Mississippi, we again meet with the elongated head in the Mandans, Ricaras, Assinaboins, and some other tribes. Yet even in these instances, the characteristic truncation of the occiput is more or less obvious, while many nations east of the Rocky Mountains have the rounded head so characteristic of the race, as the Osages, Ottoes, Missouris, Dacotas and numerous others. The same conformation is common in Florida; but some of these nations are evidently of the Toltecan family, as both their characters and traditions testify. The head of the Charibs, as well of the Antilles as of Terra Firma, are also naturally rounded; and we trace this character, so far as we have had opportunity for examination, through the nations east of the Andes, the Patagonians and the tribes of Chili. In fact, the flatness of the occipital portion of the cranium will probably be found to characterize a greater or less number of individuals in every existing tribe, from Terra del Fuego to the Canadas."*

At a meeting of the Academy of Natural Sciences held June 1st, 1841, Dr. Morton, in the course of some remarks upon the ancient Peruvians, again speaks of "the squared or spheroidal form as characteristic of the American race and especially of the Peruvians."† At another sitting of the Academy, which took place on the 6th of July in the same year, he made some observations on eight Mexican skulls, and directed attention to the "high vertex, flat occiput, great lateral diameter and broad faces" of these crania as characteristic features of the aboriginal Americans. "Whoever will be at the pains," he said on that occasion, "to compare this series of skulls with those from the barbarous tribes, will, I think, agree that the facts thus derived from organic characters, corroborate the position I have long maintained, that all the American nations, excepting the polar tribes, are of one race and one species, but of two great families, which resemble each other in physical, but differ in intellectual characters."‡

These opinions Dr. Morton continued to reiterate, from time to time, at various meetings of the Academy.§ On the 27th of April, 1842, he read at the Annual Meeting of the Boston Society of Natural History, *An Inquiry into the Distinctive Charateristics of the Aboriginal Race of America.* In this paper he contends still more emphatically for his favorite doctrine of the unity of the American nations. After alluding to the color and stature of these people, he says, "The same conformity of organization is not less obvious in their osteological structure, as seen in the squared or rounded head, the flattened or vertical occiput, the high cheek bones, the ponderous maxillæ, the large quadrangular orbits, and the low, receding forehead. I have had opportunity to compare nearly four hundred crania derived from tribes inhabiting almost every region of both Americas, and have been astonished to find how the preceding characters, in greater or less degree, pervade them all. This remark is equally applicable to the ancient and modern nations of our continent; for the oldest skulls from the Peruvian cemeteries, the tombs of Mexico and the mounds of our own country, are of the same type as the heads of the most savage existing tribes. Their physical organization proves the origin of one to have been equally the origin of all."

In this paper Dr. Morton objects to the observations of Molina and Humboldt, above referred to, in disproof of this pervading uniformity of physical characters, by saying that the different people mentioned by these writers are really of one and the same race, and readily recognized as such, notwithstand-

*Crania Americana, pp. 64, 65.
† Proc. Acad. Nat. Sci., vol. 1, p. 36.
‡ Ibid 1, p. 52.
§ See Proc. Acad. Nat. Sci., vol. 1, pp. 126, 203; vol. 3, pp. 212, 213.

ing their differences of feature and complexion; and the American nations, he thinks, present a precisely parallel case. But this objection, which is far from being a valid one, can by no possibility be urged against the analogous remarks of M. D'Orbigny.

In 1846, Dr. Morton contributed to the American Journal of Sciences,* *Some Observations on the Ethnography and Archæology of the American Aborigines*, in which he "avers that sixteen years of almost daily comparisons have only confirmed him in the conclusions announced in his Crania Americana, that all the American nations, excepting the Esquimaux, are of one race, and that this race is peculiar and distinct from all others. The first of these propositions may be regarded as an axiom in Ethnography; the second still gives rise to a diversity of opinions, of which the most prevalent is that which would merge the American race in the Mongolian."

In the same year he published *An account of his Craniological Collection; with remarks on the Classification of some Families of the Human Race*, in the form of a letter, addressed to Mr. John R. Bartlett, Secretary of the American Ethnological Society.† In this letter he thus writes:

"The anatomical facts, considered in conjunction with every other species of evidence to which I have had access, lead me to regard all the American nations, excepting the Esquimaux, as people of one great race or group. From Cape Horn to Canada, from ocean to ocean, they present a common type of physical organization, and a not less remarkable similarity of moral and mental endowments which appear to isolate them from the rest of mankind; and we have yet to discover the unequivocal links that connect them with the people of the old world."

Dr. Morton's last contribution to craniographical sciencc,‡ which was published after his death, shows conclusively that his views respecting the homogeneity of the aboriginal American races had undergone no change whatever. In this paper he still maintains the doctrine of a uniform, cranial type for these races, with the same arguments and in language almost identical with that which he employed in his *Inquiry* ten years before.

I make these references to his published opinions to show that Dr. Morton perseveringly inculcated this doctrine from the inception to the very close of his ethnological studies, comprising a period of about twenty-one years; that he was thoroughly convinced of its truthfulness, and regarded it as one of the best established and most readily demonstrable of all the conclusions at which he had arrived after a long and unwearied study of his cranial collection.

It is a remarkable fact, however, that opinions diametrically opposed to these were maintained by two French ethnologists, with whose writings Dr. Morton was familiar, and whose classifications he criticises adversely in *Crania Americana*.§ I allude to Dr. Desmoulins and M. Bory de St. Vincent.

As far back as 1826 Desmoulins divided the aboriginal Americans into two species,—the Columbians and the Americans. To the first he assigned as their chief specific character an "elongated head," and to the second "a generally spherical head." The Columbians occupied the whole of North America, all the table lands and declivities of the Cordilleras, from Chili to Cumana, and also the Caribbean archipelago. The Americans comprised the Omaguas, Gauranis, Coroados, Puris, Atures, Ottomacs, Botocudos, Guiacas, Mbayas, Charruas, Puelches, and Tehulletts or Patagonians. "There is no doubt," says Desmoulins, "that the Columbians, and still more the Americans, are each again divisible into several species, as different from each other as those of Africa.‖

* Vol. II. Second Series.

† Transactions of the American Ethnological Society, vol. 2, p. 217.

‡ Physical Type of the American Indians, in Schoolcraft's Information respecting the History, Condition and Prospects of the Indian Tribes of the United States. Part 2, p. 315.

§ Pp 63, 84, 85.

‖ Tableau Général, physique et géographique des Espèces et des Races du Genre Humain, contained in Histoire Naturelle des Races Humaines du Nord-est de l'Europe, etc. Paris, 1826.

Bory de St. Vincent divided the Americans into four species,—the Neptunian, Columbian, American and Patagonian. Of the Columbians he says: "Leur tête est bien conformée, il en résulte une figure agréablement ovale, où le front est cependant singulièrement aplati;" and of the Americans: "Les hommes ont, à peu d'exception près, la tête ronde, d'un volume disproportionné, enfoncée dans les épaules, lourde, aplatie sur le vertex," &c.*

In 1839, M. D'Orbigny, speaking of the native races of South America, declared that, after examining a large number of crania, he was convinced that they differed from each other not only according to race and nation, but also individually; and that it would be as difficult to prove that the form of the head is one among the Americans, as to demonstrate rigorously the permanent cranial characters, which would be sufficient to distinguish them from other nations.†

The late Prof. Retzius communicated to the meeting of the Scandinavian Association of Naturalists, held at Stockholm, in 1842, a valuable paper on the *Form of the Skulls of Northerns*, in which he refers the Greenlanders and some of the American races to the prognathic Dolichocephali, and others of the American family to the prognathic Brachycephali.‡ Two years later he read before the same Association, at a meeting held in Christiania, in July, 1844, another essay *On the Form of the Skull in different Nations*,§ in which he devotes a special section to the American races, and classifies them in the following manner, according to the length of the cranium:

- G. dolichocephalæ prognathæ.
  - Northern Americans.
    - Greenlanders and Esquimaux,
    - Kolusches,
    - Cherokees,
    - Chippeways,
    - Iroquois,
    - Hurons,
    - Chickasaws,
    - Cayugas,
    - Ottigamies,
    - Pottawotomies,
    - Lenni Lenapé,
    - Blackfeet.
  - Southern Americans,
    - Botocudos,
    - Caribs,
    - Guaranis,
    - Aymaras,
    - Huanchas,
    - Patagonians.
- G. brachycephalæ prognathæ.
  - Northern Americans,
    - Natches,
    - Creeks,
    - Seminoles,
    - Euches,
    - Klatskanai.
  - Southern Americans.
    - Charruas,
    - Puelches,
    - Araucanians,
    - Modern Peruvians.

* L'Homme (Homo). Essai Zoologique sur le Genre Humain; 2d edit., Paris, 1827, t. 2, pp. 6, 21.

† L'Homme Américain, t. i. pp. 118, 119, 120.

‡ Om Formen af Nordboernes Cranier, af A. Retzius. (Aftryckt ur Förhandl, vid Naturforskarnes Möte i Stockholm, år 1842.) Stockholm, 1843, p. 4. See also "Über die Schädelformen der Nordbewohner," in J. Müller's Archiv. for 1845.

§ Om formen af hufvudets benstomme hos olika folkslag. Ved Prof. A. A. Retzius, M. D. (Aftrykt fra "Forhandlinger ved de Skandinaviske Naturforskeres fjerde möde i Christiania fra 11—18 Juli, 1844.") Christiania, 1847, pp. 17, 18. See also the German translation, Ueber die Form des Knochengerüstes des Kopfes bei den verschiedenen Völkern, pp 280, 281.

G. brachycephalæ orthognathæ.	Northern Americans.	Aztecs in Mexico?
	Southern Americans.	Chincas in Peru?

The latest and best elaborated views of Prof. Retzius upon this subject are contained in a valuable essay, entitled *A Glance at the present state of Ethnology, with reference to the Form of the Skull.** This paper was read at the seventh meeting of the Scandinavian Association of Naturalists, held at Christiania in 1856. In it, the author thus criticises the theory of American unity, so long and so persistently supported by Dr. Morton:

"No European philosopher has," says Prof. Retzius, "since the time of Blumenbach, devoted such fertile labor to the subject of ethnological craniology as Dr. Morton, of Philadelphia, in his 'Crania Americana;' the results of which are, nevertheless, but little satisfactory. Morton, himself, who has brought forward so many facts of high value, has, like the distinguished linguist who with such indefatigable labor studied the American tongues, come mainly to the conclusion that both the race and the language are one. I am rather perplexed as to this result, for I must confess that, from the facts brought forward by Morton, and the numerous skulls with which he has so kindly enriched the collections in Stockholm, I have arrived at a wholly different inference. I can explain this only by supposing that this distinguished man has allowed his extensive philology and great learning to affect his vision as a naturalist. If the form of the skull is to have any weight in the question of the races of man, there is scarcely any part of the world where such contrasts are to be found between dolichocephali and brachycephali as in America, and as such they present themselves to the eye of the naturalist in Morton's 'Crania Americana.' I may just refer, for proof of this, to plate 2, 'Peruvian child from Atacama;' plate 32, 'Lenni Lenape;' plate 38, 'Pawnee;' plate 40, 'Cotonay, Blackfoot;' plate 64, 'Carib of Venezuela;' plate 65, 'Carib of St. Vincent'—all of the most marked dolichocephalic forms; and, on the other hand, to plates 30 and 31, 'Natches,' with the great majority of the figures of skulls from Chili, Peru, Mexico and Oregon, with many others of equally well marked brachycephalic form. Much as these plates bear the same testimony, I should scarcely have ventured on such a remark, did not a very rich series in our own collections, as well as several valuable drawings by Blumenbach, Sandifort, Van der Hoeven, &c., support my opinion.

"From what I can infer from the American skulls I have seen, whether in nature or in casts or plates, I have come to the conclusion that the dolichocephalic is the predominant form in the Carribbee Islands, and in the eastern region of the great American continent, from its most northern limit down to Paraguay and Uraguay; and the brachycephalic in the Kurile Islands and on the continent, from Behring's Strait, in Russian America, Oregon, Mexico, Ecuador in Peru, Bolivia, Chili, Argentina, Patagonia, and Terra del Fuego.

"Morton has also drawings of four Esquimau skulls, from the most northern parts of America, and from the island of Disco, off the coast of Greenland; all of the characteristic form. In the text he says that they are always characteristic, and that they are most decidedly distinguished from the skulls of the American Indians; but adds at the same time, singularly enough, that these Esquimaux are the only Americans presenting the Asiatic characters. It is evident that this distinguished man has been guided by his already es-

* Blick auf den gegenwärtigen Standpunkt der Ethnologie in Bezug auf die Gestalt des Knöchernen Schädelgerüstes. Von Andreas Retzius, Berlin, 1857. See also J. Müller's Archiv. für Anatomie und Physiologie, 1858; and for an English translation see British and Foreign Medico-Chirurgical Review for April and July, 1860. This translation was executed by Dr. W. D. Moore, who informs us that in the last letter which he received from Prof. Retzius, the latter says: "You give me also hope to see my ethnological views in English; I should be very thankful for that, as you see that it contains some views of, as I think, great importance; as in the question of the unity of the American races, which I have clearly shown false." This letter appears to have been written not long before the death of this eminent Swedish craniographer.

tablished views, rather than by the strict investigation of facts. He saw in the formation of the face of the Esquimaux, something Mongolian, that is, Asiatic; but he overlooked the prominent occiputs, as well as other characters which are not Mongolian. In like manner he, as it were, forgot the beautiful figures given by himself, in his splendid work of dolichocephalic American Indians; of which some in particular, as Cotonay (Blackfoot), Cherokee, Chippeway, and, above all, Cayuga (Pl. 35), approach the form of the Esquimau skull, with their large alveolar processes and projecting occiputs."*

Prof. Retzius refers the aboriginal inhabitants of America to three distinct sources. As certain Chinese skulls in the museum of the Carolinean Institute resemble Tungusian and Greenland crania, he traces the pedigree of the Esquimaux into Asia, among the Chinese population, the transitionary link being the Aleutians. The dolichocephalic Indians he assumes to be related to the Guanches of the Canary Islands, and the Atlantic tribes in Africa, as the Moors, Berbers, Tuaricks, Copts, &c., which are comprised under the Amazirgh and Egyptian Atlantidæ of Latham. The American brachycephalic tribes, which belong chiefly to the side of America looking towards Asia, the Pacific Ocean, and the South Sea, are allied, he thinks, to the Mongolian nations.†

D'Omalius d'Halloy, in 1845, divided the American Indians into a northern branch, characterized with "elongated heads," and a southern branch, having "the head ordinarily less elongated."‡

In 1846 Dr. Zeune, from a careful examination of the skulls in the anatomical collection at Berlin, adopted three main cranial forms or types for the western hemisphere. He remarks that, although Blumenbach and Prichard grouped the races of the New World together as one, he found greater and more marked differences among their skulls, than among those of the Old World.§

In 1850 Dr. Latham endeavored to show, by means of a comparative table constructed from Dr. Morton's own measurements, that the general ascription of the brachycephalic form to the American Indians was an error; and that, on the contrary, they were more frequently dolichocephalic.‖

In the same year Dr. Knox also expressed a doubt as to the "asserted identity of the Red Indian throughout the entire range of continental America."¶

In 1848, Col. Chas. Hamilton Smith declared that "it is vain to assert that all American Races, excepting the Esquimaux, have originally sprung from one stock."**

In the years 1855 and 1856, we find three other ethnologists, in widely separated localities, expressing their doubts, each from his own independent observations, as to the validity of Dr. Morton's long cherished views.

"The inspection of the Mexican skulls represented in Crania Americana," says Dr. Gosse, "seems to prove that in these the depression of the occiput was far from being as general and as marked as among the Incas and the crania examined by Meyen; for in many of them the head is rather normally developed behind."††

Dr. J. B. Davis also writes that though "this position of Morton's is no

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* Op. cit., pp. 23, 24, 29.
† Op. cit., pp. 30 and 32. See also Ofvers. Afk. Wet. Akad., förh. 1855, No. 1, pp. 5 and 6.
‡ Des Races Humaines. Paris, 1845, pp. 159, 167,
§ Über Schädelbildung zur festern Begründung der Menschenrassen. Von Prof. Dr. August Zeune, Berlin, 1846, p. 13.
‖ The Natural History of the Varieties of Man, London, 1850, p. 453.
¶ The Races of Men, 2d edit., Lond., 1862, pp. 127, 255, 256, 275.
** The Natural History of the Human Species, Lond., 1859, pp. 251, 253.
†† Essai sur le Déformations Artificielles du Crane, Paris, 1855, pp. 72, 74.

doubt founded in truth, yet it must be allowed to be liable to numerous exceptions."*

In November, 1856, Prof. Wilson, of Canada, who, for some time before, had been especially directing his attention to the conformation of the American Indian cranium, published an account of the discovery of some Indian remains in Canada West.† "No indications," he wrote on that occasion, "have yet been noticed of a race in Canada corresponding to the brachycephalic or square-headed mound-builders of the Mississippi, although such an approximation to that type undoubtedly prevails throughout this continent as, to a considerable extent, to bear out the conclusions of Dr. Morton, that a conformity of organization is obvious in the osteological structure of the whole American population, extending from the southern Fuegians, to the Indians skirting the Arctic Esquimaux. But such an approximation,—and it is unquestionably no more,—still leaves open many important questions relative to the area and race of the ancient mound-builders. On our northern shores of the great chain of lakes, crania of the more recent brachycephalic type have unquestionably been repeatedly found in comparatively modern native graves. Such, however, are the exceptions, and not the rule. The prevailing type, so far as my present experience extends, presents a very marked predominance of the longitudinal over the parietal and vertical diameter; while, even in the exceptional cases, the brachycephalic characteristics fall far short of those so markedly distinguishing the ancient crania, the distinctive features of which some observers have affirmed them to exhibit."

In August, 1857, Dr. Wilson read before the meeting of the American Association for the Advancement of Science, a valuable and interesting paper on the *Supposed prevalence of one Cranial Type throughout the American Aborigines.*‡ In this article, the mere doubt expressed a year before now becomes a positive conviction, that native American crania do not belong to one type, but are referrible to dolichocephalic and brachycephalic forms; "and that a marked difference distinguishes the northern tribes, now, or formerly occupying the Canadian area, in their cranial conformation, from that which pertains to the aborigines of Central America and the southern valley of the Mississippi; and that in so far as the northern differ from the southern tribes, they approximate more or less, in the points of divergence, to the characteristics of the Esquimaux." In the second edition of *Prehistoric Man*, published eight years later, he concludes that "the results of his attempts at a comparative analysis of the cranial characteristics of the American races show that the form of the human skull is just as little constant among different tribes or races of the New World as of the Old; and that so far from any simple subdivision into two or three groups sufficing for American craniology, there are abundant traces of a tendency of development into the extremes of brachycephalic and dolichocephalic forms, and again of the intermediate gradation by which the one passes into the other."§

It will thus be seen that Desmoulins, Bory de St. Vincent, Alcide d'Orbigny, Retzius, D'Omalius d'Halloy, Latham, and, more recently, Wilson, have all expressed their conviction, in terms more or less emphatic, that the American races are divisible, according to the form of the skull, into dolichocephalic and brachycephalic groups. Retzius and Zeune have gone a step further, by referring the crania of these races to three distinct forms or types. According to Zeune, these crania are divisible into long, broad, and high forms, corres-

* Crania Britannica, Decade 3, p. 10.

† Canadian Journal of Industry, Science and Art, Nov., 1856, p.

‡ The Canadian Journal, Nov., 1857. See also Edin. Philosoph. Journal, N. S., vol. vii. This paper, enlarged and somewhat altered, constitutes chap. 21 of the first edition, and chap. 20 of the second edition of Dr. Wilson's Prehistoric Man; and Part I of Lectures on Physical Ethnology, contributed by the same author to the Smithsonian Report for 1862.

§ Page 483.

ıding to three similar types in the Old World; and according to Retzius, o Asiatic dolichocephalic, (Chinese,) Mongolian, and Semitic forms. Zeune, his comparative table, has indiscriminately grouped together normal and ificially deformed skulls. His classification has, consequently, no ethnoic value. To Prof. Retzius is due the credit, as far as I can learn, and as ears from the above chronological reference to the literature of this sub-t,—of being the first to perceive the true ethnological import of the data forth in *Crania Americana*. From 1842 to 1860, the year of his death, he positively opposed the doctrine of aboriginal American unity as Dr. Morton lously supported it. Dr. Wilson has indisputably confirmed the views of zius as to the division of the American tribes into long and short heads, l their consequent cranial non-unity, by means of a valuable series of comative tables of measurements, accompanied with important critical obserions, showing very considerable, judicious, and even enthusiastic research.* e Humboldt and Pickering, he favors the Mongolian classification of the erican Indian, and thinks that this classification is "borne out by many nificant points of resemblance in form, color, texture of hair, and peculiar toms and traits of character."†

From a careful examination of the Morton Collection, I am convinced that division of aboriginal American crania into dolichocephalic and brachyhalic groups merely, is wholly inadequate to exhibit thoroughly the ethnic erences which dispart them, in some instances, quite widely. It is easy point out crania which are comparatively shorter than most of the so-called g-skulls; and others again, which are longer than the so-called short-heads. ch deviations fall naturally into an intermediate or mesocephalic group, ich differs from the two extreme classes not in length only, but in other racters also. Moreover, the ethnic value of dolichocephalism and brachyhalism, or of length as compared with heighth and breadth, is by no means ly determined. This character is not always of primary importance. On contrary, it is frequently of secondary value in classification. Two or re skulls may be equally dolichocephalic, and yet belong to different types forms. Compare, for example, the cranium of the typical wooly-haired ro represented on page 325 of *Indigenous Races*, with the skull of an ient Roman, or of a Circassian, figured on pages 312 and 316, respectively, he same work. These are all dolichocephalic; but the slightest inspection ws that they belong to very different types, and that the typical or differial characters are located in the facial bones chiefly. In like manner, if we pare together the Ottawa and Mound skulls Nos. 1007 and 1512, which both brachycephalic, we readily perceive that the one belongs to the erical or globular form, and the other to the square-headed or cubical type. order to establish indisputably the cranial diversity of the American races, s obviously necessary, in view of the above facts, not only to point out

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In his paper, read before the American Association in 1857,—a year after Retzius had publicly nounced his matured views upon American crania to the Scandinavian Association, and through the scientific world generally—Dr. Wilson says: "Scarcely any point in relation to ethnophic types is more generally accepted as a recognized postulate than the approximative homoous cranial characteristics of the whole American race." "The stronghold of the argument the essential oneness of the whole tribes and nations of the American continents, is the supd uniformity of physiological, and especially of physiognomical and cranial characteristics: an sical postulate which has not yet, so far as I am aware, been called into question." (Canadian rnal, Nov., 1857, pp. 409, 416.) When these lines were written, Dr. Wilson appears not to been acquainted with the labors of Retzius in this field; he certainly makes no allusion them whatever. These statements are reproduced in 1862, in the first edition of his "Prehisc Man," (pp. 205, 212.) and again in 1865, in the second edition of this deeply interesting work, 425, 430, 431.) In both these editions he alludes to Retzius simply as amongst those who e recorded conclusions similar to his own. He refers the reader, for the views of Retzius, to the rchives des Sciences Naturelles," published at Geneva in 1860, and, in his "Lectures on Physical nology," in the Smithsonian Report for 1862, p. 244, accompanies this reference with the statet that his own views on this subject were first published by him at the meeting of the Ameri-Association in 1857.

Prehistoric Man, 2d edit., p. 473.

among these races the prevalence of both dolichocephalic and brachycephalic forms, but also to demonstrate the existence of different well-marked types into which they may be grouped, and which can be shown to be as different from each other as any of the distinct forms indigenous to the Old World. This I have attempted to do in the ensuing pages, carefully abstaining, however, for the present, from the expression of any opinion concerning the allied but entirely distinct question of the origin and affiliations of these races. As this question, in its osteological aspects, is intimately connected with the consideration of the cranial characters of the Esquimau race, I propose, instead of discussing it at present, to return to it in a future monograph upon the skulls of the Polar people.

The Human Cranial Collection of the Academy of Natural Sciences of Philadelphia, contains at the present time 575 skulls of the Aborigines of Northern, Central and South America.

The Esquimau Family is represented by thirteen specimens from Baffin's Bay, Storoë, Cape Alexander, Upernavick and Godhavn. Dr. I. I. Hays, on his return from the Arctic regions in 1861, brought with him 125 skulls of this race. This large and very important collection he kindly placed in my care for study and description, with the request that I should select therefrom and present to the Academy, as his donations, those specimens which appeared to constitute the most suitable additions to the Museum.* Through these additions the Esquimau race, though occupying a region so remote and inaccessible, will be more numerously represented in the collection, than any of the North American Indian tribes.

Of the great Athapascan or Chippewyan Family, lying to the south of the Esquimau area, and extending from Hudson's Bay westwardly towards the Pacific Ocean, there is but one specimen in the Museum of the Academy. This skull, No. 577 of my *Catalogue of Human Crania*, belongs, moreover, to none of the tribes living in juxtaposition within the continuous area of the Athapascas, but to a small detached band, called Tlatskanai or Klatskanai,† living in the mountains south of the Columbia River, near the sea-coast. This tribe, now nearly, if not quite extinct, belongs to the "Tahkali-Umkwa Family" of Hale,‡ which is synonymous with the "Southern Athabaskans" of Latham.§ It is thus classified on account of its philological affinities, which are Athapascan.

It is obviously impossible to determine the craniological relations of the Tlatskanai, and through these of the Athapascas generally, by means of the single cranium just referred to. This skull is artificially distorted or compressed like the Chinook crania. The longitudinal and bi-parietal diameters are nearly equal. Art has, therefore, rendered it brachycephalic. The upper alveolus is quadrangular in form.

To enumerate the various tribes of Athapascas of which cranial specimens are wanting in the collection, would be to go over the entire list of these tribes as now known. In view of the geographical position of this group, this is much to be regretted. The Koluschians and Athapascans on the west of Hudson's Bay and the Algonquins on the east are the only Indians coterminous with the Esquimaux. The Athapascan area borders upon the Esquimau region over a much greater extent of surface than that of either the Koluschians or Algonquins. Among the Athapascas, the Coppermine, Dog-Rib and Hare or Slave Indians come in contact with the Esquimaux as far north as the Arctic circle. As they are thus exposed to the same climatic conditions it becomes very important to compare the crania of these tribes with those of their paraborean neighbors. The same remark applies to the northernmost of the Ko-

* See Proceedings of the Acad. Nat. Sci., 1862, p. 601.

† Called Klatstoni by Morton, who figures and gives measurements of this skull in Crania Americana, plate 44, p. 210.

‡ Transactions of the American Ethnological Society, vol. 2, p. 9.

§ The Natural History of the Varieties of Man, p. 308.

luschian and Algonquin tribes. Unfortunately for the purpose of such comparison no specimens of the skulls of these tribes are in the possession of the Academy. In other words the collection is deficient in skulls of the Kenai of Cook's Inlet, the Atnahs of Copper River, the Ugalents or Ugalyakhmutzi, of King William's Sound, &c., among the Koluschians; and in the Knistinaux or Crees, and the various other tribes of Algonquins who formerly occupied the country between Labrador and the New England States.

The Indians of the north-west coast are represented in the collection by 22 specimens, obtained from various localities in British Columbia, Washington Territory, and the State of Oregon. Three of the skulls of this series, a Tsimse-ânn or Chimseyan and two Nas-kàhs or Naaskoks (Nos. 987, 213 and 214 of the *Catalogue*), belong to the Naas family of Hale, and are from the Naas River and the region of country about Fort Simpson, in lat. 54° 40′ N. Consequently of all the Pacific coast crania in the collection they are the most northern. The Chimseyan skull is a long, low head with a moderately full and rounded occiput. The coronal region is flat and triangular, narrow at the forehead between the external angular processes, from which it widens out to a great interparietal diameter, the parietal protuberances being very prominent. Both the Naas crania are long, oval heads with full and prominent occiputs. In No. 213 the occipital protuberance is prolonged into a sharp mammillated process. The next six in geographical order, (Nos. 208, 944, 946, 1013, 1014 and 1015), are from Puget's Sound. No. 208 is the skull of a Skwale or Nisqually "Medicine Man." It is artificially flattened. The other five are flattened heads, obtained by my friend Dr. Thos. J. Turner, of the U. S. Navy. They probably belong, with one exception, to the Suquimmish tribe. These six crania together with a Kowalitsk skull, (No. 573) from Washington Territory, and a Tilamook, Killemook or Killamuck cranium (No. 576) from the State of Oregon, belong to the Tsihaili-Selish Family of Hales, the Tsihaili of Latham. The next two crania of this group are Klikatats (Nos. 207* and 461) from Washington Territory. They belong to the Sahaptin Family of Hale and Gallatin. Of the Calapooya or Kalapuya tribe of the Willamette Valley, Oregon, there is one cranial specimen, No. 574. There are nine Chinook crania in the collection. Of these Nos. 462, 641, 721, 1349 and 1350 are Chinooks proper. Nos. 203 and 575 are Clatsops or Klaatsops, a band of the lower division of Chinooks, occupying the sandy plain at Point Adams, to the south of the mouth of Columbia River. Nos. 457 and 578 should, in all probability, be rejected from this series. As they are not flattened nor distorted in any manner, but retain the natural form, they are very likely slaves, and as such belong to some other tribes. All the free Chinooks flatten their heads, and so highly do they value this deformity as a mark of distinction that they do not allow their slaves to practise it.

Upon this point most of the travellers who have visited the tribes of Columbia River agree. In other respects, however, their testimony is very discrepant. Mr. Townsend, in a letter to Dr. Morton, affirms that he "has occasionally seen both Chinooks and Chickitats with round or ordinary shaped heads, sickness having prevented the usual distortion while young."† This statement has evidently led Dr. Morton to regard No. 578 as a true Chinook skull which has not been subjected to the flattening process. "This head," says Dr. M., "differs in nothing from that of the Indians in general, from one end of the continent to the other; but it is gratifying to be able to present a perfectly natural skull of people among whom a round or naturally formed head is considered a degradation."‡ Dr. Pickering assures us that as the children, whose heads have been compressed, "grow up, the cranium tends to resume its

* Nos. 203, 207, 208, 213 and 214 were obtained by Mr. Geo. Gibbs, who informs me that No. 207 is a hybrid being half Klikatat, half Nisqually.

† Crania Americana, p. 207.

‡ Ibid, p. 208.

natural shape, so that the majority of grown persons hardly manifest the existence of the practice. One effect, however, seemed to be permanently distinguishable, in the unusual breadth of face."* Mr. Hale also says: "In after years the skull, as it increases, returns in some degree to its natural shape, and the deformity, though always sufficiently remarkable, is less shocking than at first."† Dr. Pickering declares "that slaves may in general be distinguished by the head not being flattened, though they are careful to perform this process on their children."‡ Mr. Hale, on the contrary, states that "the children of slaves are not considered of sufficient importance to undergo this operation, and their heads, therefore, retain their natural form." Mr. George Gibbs, who dwelt for several years among the coast tribes in the capacity of Indian agent, likewise declares that "the children of slaves are not allowed to flatten the skull."§ In another place he says, "among some of the Pacific tribes, compression of the head is confined to females, or is, at any rate, only carried to any considerable extent among them. Slaves are sometimes of the same tribe with their owners, but they are more frequently purchased from others; and it should be noted that on the Pacific the course of the trade has been from south to north."‖ This gentleman, in an interesting letter to the writer, dated July 8th, 1859, suggests that "as slaves very rarely if ever spring from the tribes in which they are held, and as the course of the slave trade is almost always from the south to the north," the two skulls above referred to, Nos. 457 and 578 most probably come from southern Oregon or California. The Klamath and Shaste tribes of California, he thinks, furnish many slaves to the region about Fort Vancouver, while captives from this region are taken still further northward from Puget's Sound as far north even as the Russian possessions. In opposition to these statements of Mr. Gibbs, we are informed by Mr. Townsend, that among the Chinooks those individuals whose skulls were not flattened during infancy, on account of sickness, "never attain to any influence, nor rise to any dignity in their tribe, and are not unfrequently sold as slaves." Mr. Jas. G. Swan, in his account of the coast tribes between the Straits of Fuca and the Columbia River, says, "their slaves are purchased from the northern Indians, and are either stolen or captives of war, and were regularly brought down and sold to the southern tribes."¶ My friend Dr. Thos. J. Turner, U. S. N., who spent some time at Puget's Sound, in 1856, and whom I therefore interrogated upon this subject, informs me that there is a marked distinction between the Indian tribes on Vancouver's Island and to the north of the Straits of Fuca, and those on the southern side. The northern tribes known as Stikanes, or Cowitchins, are taller, more war-like, and of a lighter color than the southern Indians, and what is very remarkable, have been seen by him to blush.** Instead of compressing their heads into a disc-like shape, as the Chinooks do, they give to them, by means of bandages, a conical or sugar-loaf form. Further north this custom is discontinued by the men, and is confined altogether to females. Dr. Turner also informs me that unaltered heads, found among tribes addicted to this practice to a great degree, may safely be assumed to be those of slaves, and are probably of foreign origin, either directly or ancestrally. The direction of the slave trade is northward. On this account the southern tribes are always in fear of their more aggressive northern neighbors. As the

* The Races of Man; and their Geographical Distribution. By Charles Pickering, M. D., London, 1851, p. 19.

† Transactions of the American Ethnological Society, vol. 2, p. 16.

‡ Op. cit. p. 20.

§ Indigenous Races of the Earth. p. 336.

‖ Instructions for research relative to the Ethnology and Philology of America. Prepared for the Smithsonian Institution, by George Gibbs, Washington, 1863. p. 3.

¶ The North West Coast; or Three Years residence in Washington Territory. By Jas. G. Swan, New York, 1857, p. 166.

** According to Von Spix and Martius, "the Indians, properly speaking, cannot blush, and the 'Erubescit, salva res est,' cannot be applied to this unpolished race." See Prichard's Researches, vol. 1, p. 271.

flattened head in all its varieties is considered a mark of distinction among these people, they are very loth to abandon it. In several instances, where the "papooses" came under medical treatment, efforts were made to induce the mothers to discontinue the practice, but without avail.

These conflicting statements show how difficult it is to determine satisfactorily whether Nos. 457 and 578 are Chinooks or not. The latter somewhat resembles the Naas skull, No. 214, but is comparatively shorter and broader. The former is more like the Chimseyan. If they are really Chinooks, it shows that these people are naturally dolichocephalic. Judging from the deformed specimens, I should suppose the heads of the Chinooks were naturally short or brachycephalic. The unflattened Chinook, No. 578, is a rather short, broad oval, having the vertex regularly and more highly arched, and the occipital region less prominent, rather flatter in fact, than is the case in the Arickaree and Assinaboin crania. No. 457 approaches the peculiar form exhibited in a Pocasset skull, presently to be referred to.

Upon a careful examination of all the cranial specimens of these flat-head tribes of the Columbia River, I find that the distortion is not alike in all. In Nos. 203, 207, 208, 461, 577, 641, 721, 946, 1013, 1014 and 1349 the compression has been so applied as to cause the right half of the occipital region to be more flattened than the left, and, consequently, the antero-posterior diameter of the right side to be shorter than the left. In Nos. 574 and 575 the distortion is just reversed. Nos. 462, 573, 576 and 944 are almost symmetrically flattened, and in such a manner that the coronal region forms a horizontal plane parallel with the basis cranii. In the Kawichen skull, No. 1015, the pressure has been so applied as to give to it the form of a cone or sugar-loaf, causing it thereby to resemble very strongly the strangely deformed Natchez crania, and the Mound Skull, No. 1242, from the ancient town of Chiuchiu, near the Desert of Atacama.

Three crania recorded in the third edition of Dr. Morton's *Catalogue of Skulls*, as belonging to "Cotonay or Blackfoot Indians,"* differ from each other sufficiently to justify the reference of them to two separate groups. While Nos. 744, a male skull, and 745, a female, are decidedly dolichocephalic, No. 1227, the head of a chief named the Bloody-Hand, from the upper Missouri, occupies an intermediate place between the long and short heads. It is a shorter, broader and more elevated or arched cranium. In Nos. 744 and 745 the occipital region exhibits the superiorly inclined or shelving parieto-occipital flatness so characteristic of Swedish and Norwegian crania. The occipital flatness of No. 1227 is less inclined and more vertical. In the length of skull, prominence of occiput, and general shape of the coronal region, No. 744 resembles the cast of a Norwegian skull, No. 1260, which I have in another place already briefly described. The receding forehead, strongly marked supraorbital ridges, and everted upper alveolus of the Kootenay cranium, however, serve to distinguish it from the Norwegian. In general form No. 745 resembles the Arikaree type, as that type or form is displayed in No. 649. No. 1227, in the general outline of the coronal region and flatness of the occiput, resembles the short-headed Germanic and Anglo-Saxon forms. On the other hand, the strongly-marked face, the deep, massive jaw and prominent maxillary alveoli of this skull are striking points of difference. In *Crania Americana*, plate 40, Dr. Morton figures a Kootenay skull loaned to him by Geo. Combe, the celebrated phrenologist. It is decidedly dolichocephalic. Dr. M. has given us no description of this head, but merely alludes to its great interparietal breadth. I am inclined to think that No. 744 is really the cranium from which this plate was drawn. There is not only a close resemblance in the outlines of the two, but in the skull there is a hole in the

*The Kitunaha or Skalsa; Kootenays, Coutanies, Arcs-en-Flat, or Flat-bows, inhabit the western side of the Rocky Mountains, on the Flat-bow branch of the Columbia River. They are not Blackfeet, and though they hunt on the Missouri, they do not live there.

middle of the right parietal bone, just above the tuberosity, exactly as represented in the plate. A comparison of this plate with the wood-cut of No. 1227, in the *Catalogue of Human Crania*, and also in *Indigenous Races*, is sufficient to show that in this group of three skulls two distinct forms exist. No. 744 may be assigned to the kumbecephalic, and No. 745 to the narrow oval subdivisions of the oval form or type. Both have flat and receding foreheads running up to a higher point at the junction of the sagittal and coronal sutures or just behind this point. No. 1227 falls into the arched type.

To the isolated or unplaced family of the Kitunaha, Coutanies or Kootenays, therefore I provisionally refer Nos. 744 and 745; and to the Satsika or Blackfoot branch of the Algonquins, No. 1227.

To the east of the Blackfoot country, and extending from the Saskachawan River on the north southwardly to the Arkansas River, and from the Mississippi to the Rocky Mountains, lies an important ethnological region occupied by the Dacota and Pawnee Families of Indians. The latter live in two separate localities, surrounded in great part by the more numerous tribes of the former.

Of the Pawnee group the collection of the Academy contains three Arikara, and two Pawnee skulls. The Sioux or Dacota Family is represented by specimens from eight different tribes, viz., Assinaboins, Minetaris, Mandans, Dakotas or Sioux's proper, Upsarookas or Crows, Osages, Ottoes, and the isolated tribe of Winnebagos living on the western shore of Lake Michigan.

Three female Arickaree skulls from the upper Missouri, (Nos. 649, 949, 748) belong to the dolichocephalic class. The coronal region in No. 649 is oval and rather flat, the vertical diameter, therefore, rather small; the occipital protuberance quite prominent, as in the Cimbric and Swedish crania in the collection, and the upper half of the occipital region flat and shelving like that of the Swedes; the forehead low, superciliary ridges very small, malar bones not very prominent; ossa nasi quite incurvated. The basis cranii of No. 649 exhibits some approach to the kumbecephalic form of Prof. Wilson. No. 949 exhibits the same general characters, but is fuller in the frontal region, and has a less prominent occipital protuberance. The same remarks apply to No. 748. In the homoiocephalic comparison of the old and new worlds, these Arickaree skulls may be fairly regarded as the American representatives of the Swedish crania.

The two skulls in the collection marked Pawnee are remarkably discrepant in form. One of them, No. 1043, is most probably an Arickaree cranium. The other, No. 540, is a female head from the Platte River. It is figured in *Crania Americana*, plate 38. In this skull the forehead is sufficiently depressed, to cause the posterior part of the head to be higher than the anterior. From the coronal suture, the median longitudinal line, coinciding with the sagittal suture, curves regularly and evenly round to the upper edge of the os occipitis. Hence the posterior region cannot be called flat, although at the first glance it appears so, in consequence of the prominence of the occipital boss. If the line of the crown is continued evenly to the base of the skull, so as to cut off the occipital protuberance, it will then be seen that the posterior region is full and round. This is not the case in No. 1043, also female, which is a longer head with a much more prominent occipital boss. The basis occipitis of this skull is flat, somewhat like that of the Minetaris, while the basis cranii exhibits a long cimbriform outline instead of the round one presented in No. 540. In fact No. 1043 resembles the Arickaree forms in many respects; and should, I think, be classified with this group. It differs from them, however, in such minor particulars as the form of the alveolar arch, breadth of upper maxilla, &c.

To the dolichocephalic group must also be assigned the Minetaris or Grosventres of Missouri. The oblong coronal region of the four cranial specimens of this tribe in the collection resembles that of the Arickarees and Assinaboins. The most elevated point of the crown is in the middle of the sagittal

suture, a little anterior to a line drawn through the parietalia from one eminence to the other. The posterior region of the parietalia slopes downwards and backwards to the irregular and lozenge-shaped occipital protuberance. The basal portion of the occipital bone is remarkably flat,—nearly horizontal, in fact,—and the cerebellar fossæ quite shallow. This peculiarity is well-marked in all the specimens composing this group. This feature and the prominent occiput give to the Minetari skull the appearance of being pinched or drawn out behind. This is particularly the case in No. 746. The low crown, flat sides and base of these skulls give them an angular, obleng or box-like appearance. The specimens of this group, three of which are females, and the fourth a male, are remarkably alike.

Three Assinaboin skulls, also from the upper Missouri, (Nos. 659, 1230, 1231) are larger than the Arickarees, as shown by their greater internal capacity. They are more massive and roughly marked, and in general present more of the rude Indian character. They are broader between the parietal bosses than the Arickaree heads; and, consequently, have a less narrow, and somewhat differently shaped coronal region. The contour of the latter slightly approximates the Germanic form. The occiput in No. 659, a male skull, is equally protuberant, more massive and flat in the upper part, and the nasal bones less incurvated than in the Arickarees. These features are not so well marked in Nos. 1230 and 1231. It will thus be seen that No. 659 differs more from the Arickarees than Nos. 1230 and 1231, but the two latter, like the Arickaree specimens, belong to the female sex. Upon the whole, the base is not so long and narrow.

The Mandans of the upper Missouri are a long-headed people. The general form of their skulls resembles very closely that of the Arickarees and Assinaboins. This is very well shown in Nos. 643, 644, 738 and 742; of which the first three are females, and the last a male. In No. 739, a female skull, the occipital protuberance is not so fully developed, but the posterior interparietal diameter is greater. The coronal contour, consequently, undergoes some change. In a male skull, No. 740, the broader coronal region is more oblong than oval. In No. 741, also a male skull, the greater elevation of the bregmatic region gives to that skull the arched or upsicephalic form presently to be described. No. 738 closely resembles the Kootenay skull, No. 745.

No. 204, the skull of a Dacota or Sioux Indian, belongs to the Creek type, as exhibited in No. 1454, though the occiput is a little more prominent, and the head slightly longer and narrower. Its form is transitionary from the broad oval of the Assinaboin skull. No. 112, the head of a Dacota child, is markedly dolichocephalic, with an occipital region like a shelving roof. No. 605, the skull of a Dacota or Sioux Indian from Wisconsin, somewhat resembles the Chetimache type, as the reader will perceive at a glance, by comparing plates 19 and 39 of *Crania Americana*. The truncation of the occiput is confined entirely to the upper part of the os occipitis and is but slightly marked. Indeed the posterior region taken as a whole is full and rounded or globular like that of the Pawnee skull, No. 540. These two heads, in fact, resemble each other closely, so that it is difficult to say whether both be Pawnees or both Dacotas. They certainly appear to belong to the same tribe. Dr. Morton speaks of having once seen in Philadelphia, in 1837, twenty-six chiefs and braves of the Sioux nation. "Every man of them," says he, "had a broad face, high cheek bones, the large Roman nose expanded at the nostrils, a wide but low forehead and flat occiput."

The Osages are brachycephalic, as is particularly shown in No. 54, in which the coronal region is almost round like that of the true Germanic head, and the occiput perpendicularly flattened. This skull, which is that of a young warrior named the Buffalo Toil, from Arkansas, is figured by Morton in *Crania Americana*, plate 41. The face is large and rude, the malar bones massive, and the alveoli prominent; but the forehead is less recedent than in many of the Indian crania. The skull belongs to the angularly round or

square-headed Gothic type. No. 650, from the upper Missouri, is an older and longer head, inclining rather to the Swedish form. It is not a Brachycephalus, but occupies a position intermediate between the long and short heads.

The Ottoes of the upper Missouri belong partly to that intermediate form which I have designated in the preceding pages as the arched type, and partly to the short-headed groups. The oblong crown in No. 755 is considerably elevated at the junction of the sagittal and coronal sutures. The occipital region is full, broad and round, and not flattened. These skulls all incline to the brachycephalic type. Indeed No. 756, which may be said to represent the Calmuck form, and No. 758, should be classed among the short heads. No. 758, the head of a young child, though longer, has a vertically flat occiput.

The Upsarookas or Crow Indians of the upper Missouri are long-heads. The two skulls of this tribe in the collection are males, and resemble each other very closely. They are long, oval crania; the upper part of the occiput protuberant and lozenge-shaped; the face long, the ossa nasi high, and the depth of the upper alveolus so considerable as to give a peculiar osteological expression to the face not easily described.

Of the Winnebagos, one, No. 559, is a short, angularly round head; the other, No. 560, is of an oblong form. In No. 559 the slight posterior flatness is confined entirely to the upper part of the os occipitis. In No. 560 the occiput is more protuberant, and the base and crown longer than in No. 559.

Of the great and widely extended Algonquin Family, the Museum of the Academy contains 79 skulls of 21 different tribes. These tribes are the Massasaugas or Missiosigees, and the Chippewas of Upper Canada, the Penobscots of Maine, the Mohegans of Connecticut, the Narragansetts and Pocassets of Rhode Island, the Naumkeags of Massachusetts, the Naticks of Nantucket, the Lenni-Lenapes or Delawares of New Jersey, Pennsylvania, &c.; the Nanticokes of the Wyoming Valley; the Ottawas, Menominees and Pottawotomies of Michigan; the Sauks, Ottigamies and Illinois of Illinois and Wisconsin; the Miamis of Indiana; the Shawnees and Mingos of Ohio; the Shyennes of Missouri, and the Blackfeet.

The Iroquois family is represented in the collection by 13 crania of Mohawks, Oneidas, Senecas, Cayugas and Hurons. The former habitat of these tribes was the country around and between Lakes Huron, Erie and Ontario, in the heart of the Algonquin area. Of the southern Iroquois the collection contains not a single specimen.

The Massasauga cranium, (No. 27,) of upper Canada, is a decidedly dolichocephalic head with a protuberant occiput, a moderately elevated coronal region, and an oval base. In its general form it resembles the Arickaree skulls.

The Penobscot skulls may also be classed with the Dolichocephali. They are narrow and rather long, with a regularly oval crown. The occipital region is rather narrow, but not flat, being smoothly rounded; the elevation of the crown about the middle of the sagittal suture, by increasing the vertical diameter, slightly approximates this skull to the arched type. These remarks particularly apply to No. 89, an Indian of the Gepepscot tribe of Maine. No. 105, is very similar to it, but being fragmentary, and of uncertain locality, it need not further occupy our attention.

A Mohegan or Mohican skull of the Quinnipiack tribe, (No. 26), is broad and globular with a rounded occipital region. It occupies a position intermediate between the long and short heads and approaches the Mongol form, as that form is exhibited in the Calmuck, Cossack and Burat crania.

A Pocasset cranium (No. 1036) is comparatively short with a flattened occiput and triangular coronal region. It strongly resembles the Narragansett head, No. 693, and should probably be grouped with this specimen.

The Narragansetts of Rhode Island are dolichocephalic. The ten skulls representing this tribe in the collection are not equally elongated. On the contrary, Nos. 693, (male,) 953, (female,) and 956, (male,) are much

shorter, and may be said almost to belong to the Brachycephali. No. 693, the *fac simile* of the Pocasset skull just referred to, is a peculiar head. The coronal region is irregularly oblong; the head widens out backwards from the os frontis, attaining its greatest width between the parietal centres of ossification. Moreover, the low receding forehead slants upwards to the same interparietal diameter. The broad posterior region slopes downwards to the foramen magnum, as if pressed under the overhanging parietalia. Nos. 950, (female,) 951, (male,) 954, (female,) 957 (male) and 1040, (female,) are oblong heads, having for the most part the superior occipital flattening seen in Swedish crania, and also the protuberant occipital process, which is of the usual size and appearance in Nos. 950 and 954, and forms a very large triangular knob in No. 951, projecting in a straight line beyond the inferior and posterior edges of the parietalia, as in the Swedish skull, No. 1249. In No. 957 the protuberance disappears, or is very much softened down, in consequence of the cone-like manner in which the whole posterior region converges to a blunt point. The basal surface of the occiput is non-symmetrically flattened, the right half being pressed up towards the parietals more than the left. This flattening is probably posthumous. In No. 955 we have another instance of this apparently posthumous deformity. The highest point of the vertex in No. 957 is at the anterior fontanelle. In No. 1040 the protuberance of the occiput overhangs the basal portion like a ridge. In this skull is also exhibited the basi occipital flatness which, as we have just seen, characterizes the Minetari skulls. No. 952 is asymmetrical, the right half being a little shorter than the left. No. 953 belongs to the arched type. A slight flatness is observable in the posterior, inferior part of the parietalia, but the occipital bone curves regularly round to the foramen magnum without any flatness whatever. The same remarks apply to No. 956. Nos. 953 and 957 are remarkably prognathic. In No. 953 the prominence of the maxillæ gives to this skull a negro-like appearance.

A Naumkeag skull (No. 567) from Salem, Massachusetts, is a long, narrow oval head with a projecting occiput, and a high coronal region which is distinctly carinated.

Five Natick skulls from Nantucket, upon the whole, appertain rather to a form intermediate between the Dolicho- and Brachycephali, than to either one of these classes. The elevated vertex and but moderately prominent occiput give to No. 103 the arched form. No. 104 is a longer head, with a flatter crown and a more protuberant occiput. No. 107 is an oblong, dolichocephalic head. In No. 110 the upper part of the hind head is flat, and the protuberance of the occiput lozenge-shaped.

The Natick and Narragansett skulls may be said to represent the woolly-haired African form.

The Lenapé or Delaware Indian skulls in the Academy's collection, also fall, for the most part, into the dolichocephalic class. With the exception of Nos. 205, 206 and 1263, they are long, though not strikingly narrow heads. The general outline of the coronal region resembles that of the Arickarees, Assinaboins, Cherokees and Iroquois,—occupying a place in fact between the latter two. The occipital boss, though protuberant, is less so than in the Arickaree, Assinaboin and Cherokee heads. The occipital region is superiorly flattened. The upper jaws are more salient than in the heads already described, amounting in the female skull, No. 40, as shown in *Crania Americana*, plate 32, to negro-like prognathism. No. 1263 may be regarded as a Brachycephalus. In consequence of the posterior, interparietal diameter being greater than the frontal, the contour of the coronal region differs from that of the others of this group, and resembles that shown in some of the German skulls, especially No. 706. The posterior region is broad and perpendicularly flattened. The coronal outline of No. 1265 resembles in some respects that of No. 1263. Nos. 205 and 206 dug up from a street in Philadelphia, and sent to the Academy as Delaware Indians, are very similar in form to Nos. 1263

and 1265. They appear to be very old. The ten specimens composing this whole group appear to belong to a form or type of skull differing in many respects from those to which most of the heads already alluded to belong. Nos. 40 and 115 are narrow ovals; Nos. 118 and 418 may be classed in the same group, but they approach the arched type by being higher. They are, indeed, transitionary in form to Nos. 1264 and 1265, which are still more elevated in the coronal region. The form again changes in No. 1263, which is shorter, has a triangular crown and a flatter and broader occiput, and is arranged therefore among the short heads with vertical occiputs.

The Nanticoke head (No. 1219) is a broad, low skull, with a full rounded occiput. It resembles somewhat, No. 26, the Quinnipiack or Mohegan cranium.

The form of the Mingo skull (No. 455) is a long oval, with a broadly oval crown and base, and a prominent occiput.

The Ottawas of Michigan may be partly referred to the arched type. No. 1007 is brachycephalic. It is a broad, low and round head. A greater prominence of the occipital boss in Nos. 1006, 1008 and 1009, causes these three skulls to depart somewhat from this type and approach the Swedish form. I have consequently placed them in the dolichocephalic division.

The cranial specimens of the Menominees of Michigan, in the collection, differ from each other in their general configuration not a little. No. 35, the cranium of a female, resembles the Pocasset skull above referred to,—a skull the principal characters of which are a recedent forehead, a relatively broad posterior, interparietal diameter, and a flatly-rounded occiput. No. 563, also a female head, resembles No. 35, but is rather less recedent in the forehead, has a broader base, and a fuller and broader occipital region. No. 78, a male skull, is a long head, with protuberant occiput, the protuberance flattened vertically, and the lower and posterior parts of the parietalia flattened like an inclined plane. The median longitudinal line of the crown, in consequence of the more expanded forehead, approaches an oval figure. A fuller forehead, less prominent occiput and higher bregmatic region gives to No. 44, (a female head,) the arched form. The contour of the coronal region of No. 1220 is a broad, rounded oval. The posterior region is full and rounded. In No. 1222, a Menominee chief, the crown is a longer oval, the line of the sagittal suture more arched, and the occipital protuberance well pronounced. No. 454, figured by Morton in *Crania Americana*, is a short, round and asymmetrical head, with a fuller frontal region and a less flat occiput than we find in the others. It has a Germanic crown.

Two male Chippewa or Ojibway skulls in the collection (Nos. 683, 684,) belong to the Dolichocephali. In the general form of the calvaria they resemble Swedish crania. They differ from the latter, however, in other respects, particularly in the face, which, singularly enough, in its *osteological expression* is very like the face of the Chinese skull. In this respect No. 684 (Chippewa) resembles No. 94 (Chinese) not a little.

Among the Miamis of Indiana we again encounter the dolichocephalic type. No. 542, the skull of a chief, (plate 30 of *Crania Americana*) is in many respects like the German heads in the collection, especially those from Tübingen, Frankfort, Berlin, &c. It is less full in the forehead, and more prominent about the middle of the sagittal suture. It has the Swedish occiput. In the whole series, except Nos. 541, 1055, 1058 and 1233, the outline of the crown forms a more or less rounded oval. In No. 1055, a female skull, this outline approaches the angular Gothic form, which is still better displayed in Nos. 1058, a young child, and 1233 also a female head, and is characterized by a disproportionate breadth between the parietal protuberances. No. 541 is a narrow, oblong head. No. 106 approaches the arched type. In all the specimens the forehead is quite well developed; and in most of them the upper part of the occiput is slightly flattened. In Nos. 1058 and 1233 the flatness is nearly vertical.

In the two Illinois skulls the occipital region is wanting. No. 1010 evidently

belongs to the mesocephalic form. No. 1051* is a Mound skull. It was found in 1848, in a tumulus on the Blue River, Illinois. Enough of the parietals has been preserved to show that the posterior region was flattened and that the head should be placed among the Mesocephali.

The Ottigamies or Fox Indians, of Illinois and Wisconsin, belong to the short-heads. Nos. 639 and 694, both male skulls, strongly resemble the angularly round or square form. The outline of the coronal region is nearly a rounded square. The occiput is almost vertically flat. No. 209 differs from these two in having a less wide sinciput. No. 415, a half-breed, is a long head with a retreating forehead, a broad crown and the Swedish form of occiput.

The Pottawotomies of Michigan are Dolichocephali. No. 657 (plate 34 of *Crania Americana*) is a rude, massive, male skull, "remarkable," as Dr. Morton has observed, "for its capacity behind the ears, and for the great length and flatness of the coronal region." The apparent flatness of the crown is in part due to the angular prominence of the parietal bones at the anterior third of the sagittal suture. The forehead is low; the posterior region large, broad and angular, with no very decided or marked flatness. In No. 737, a male skull, the crown is broader in proportion to its length than in No. 657, and less flat; the posterior region round and full. The parietal bones at the anterior portion of the sagittal suture are less prominent than in No. 657. No. 1322, a young Potawatomie warrior, varies from the others in being narrower and having a somewhat more prominent os occipitis. The face reminds me of the Chinese physiognomy.

No. 736, the cranium of a young child, is brachycephalic, with a flat occiput and bulging parietalia.

The Sac or Sauk Indians may be called long-heads. In No. 561 the crown is oblong; the highest point at the junction of the coronal and sagittal sutures. The upper part of the occiput is irregularly lozenge-shaped and prominent, the basal portion rather flat. No. 1246 is a rudely carved and massive head, almost vertically flattened behind. The lower part has somewhat the appearance of being pressed underneath towards the foramen magnum.

Two of the three skulls in the collection, marked Shawnee, are dolichocephalic, the other is brachycephalic. They are of uncertain history and locality, however, and cannot be relied upon as genuine representatives of this tribe. No. 606 is a long, narrow, oval head, resembling the Pawnee and Arickaree forms. No. 691, a remarkably inequilateral skull, belongs to a very different form. The whole head is broader, and the posterior region flattened almost entirely to the right of the median line. No. 1210, like No. 606, is a long, narrow head; the median, longitudinal line of the crown slightly carinated after the fashion of the Eskimau skulls. The posterior region is broader and more protuberant than in No. 606, while the elevation of the vertex causes the skull to approximate the arched form.

A Shyenne skull, (No. 1041), from Fort Williams, Arkansas river, belongs to the arched form. The superior alveolus is prominent, while the back of the head shelves downwards and backwards like an inclined plane. This cranium resembles the Chippeway (No. 684) and Blackfoot (No. 1227) heads. No. 939, also a Shyenne, from the neighborhood of Fort Kearney, differs somewhat from the preceding. It is less highly arched, the occipital region is less prominent, and the crown more triangular and broader between the parietal protuberances.

The Iroquois skulls in the collection are Dolichocephali. They may be classed very appropriately with the Cherokees. No. 16, exhumed near Lake Erie, closely resembles No. 632. The occipital region is flattened superiorily. No. 989 is probably not an Iroquois skull, though so marked. Its form differs very much from the others. These three crania, though grouped with the oval forms, occupy in reality an intermediate place between the oval and arched types.

* Erroneously numbered 1042 in the Catalogue.

Of three Mohawk skulls exhumed near Manheim, in New York, two are long-heads, (Nos. 895, 896), and one (No. 897) is intermediate in form between the long and short-headed groups. They may be said to belong to the arched form. They are shorter, broader and rounder in the base than the Cherokees, Arickarees, Assinaboins, Minetaris, Iroquois, &c., but less round than the Creeks, Chetimaches, &c. The posterior region is full, and the occipital protuberance though well developed, is not so prominent a feature as in some of the long heads.

The Oneida skull (No. 33) exhibits the arched form. It is a long, narrow head with a long, narrow face and small cheek bones.

The Seneca cranium (No. 1516) belongs to a peculiar variety of the same general form, but is broader, and has fuller frontal and occipital regions, and a broader base. Both it and the Oneida are long heads. Occipital region rather flat.

The skull of Wan-yùn-ta, a Cayuga Chief, (No. 417), is a very long, narrow, oval head, somewhat kumbecephalic, with a prominent occipital protuberance.

The Huron crania belong partly to the Brachycephali, and partly to the Mesocephali. No. 15, the head of a Huron Chief, killed near Detroit, is a massive, strongly marked and brutish skull. The forehead is flat and receding; the superciliary ridges very prominent; superior maxilla everted; lower jaw ponderous and flared out at the angles after the manner of the typical Eskimau skull; malar bones projecting; ossa nasi much incurvated; junction of parietal bones ridged or keel-like; skull rather narrow; occipital protuberance pretty well marked; anterior bregmatic region elevated, giving an arched outline to the whole head; occipital flatness in the upper part of the posterior region. In its general configuration, as viewed laterally, it resembles the Creek and Chetimache skulls, but differs from them in greater elevation of crown. This coronal elevation is shown also in the other three skulls in this group, (Nos. 607, a female, from Cleveland, Ohio, 1217 and 1218, also female, from Detroit), which all exhibit this arched form, except No. 1217, which is nearly round. They are all short heads. Nos. 607 and 1218 have the Swedish form of occiput; the shelving, however, is not well marked, and the occipital protuberance not very prominent. In No. 1217 the occiput is flattened both above and below the protuberance. The whole posterior region is here broad and flat.

Thirty-five crania from eight different tribes have been contributed to the collection from the States of Louisiana, Mississippi, Alabama, Georgia, Florida and the Southern part of Tennessee; or, in other words, from that section of the United States comprised between the Cumberland River and the Gulf of Mexico, and the Savannah and Sabine rivers. These tribes are the Cherokees, Muscogees or Creeks, Yamassees, Seminoles, Uches, Choctaws, Natchez and Chetimaches.

There are six Cherokee skulls in the collection. Of these two, (Nos. 632, 634) belonged to women, and two (Nos. 633, 635) to young girls, while two ancient crania from the mounds in South Carolina (Nos. 1285, 1297) are males.

No. 632, found "in a cave at Springtown, Polk Co., Tennessee, north of the river Hiwassee, and near an ancient battle-ground," is a beautifully formed female head, ætat 20 years. It is regularly and symmetrically oval. The forehead, though low, rises evenly and gradually from the nasal suture up towards the coronal region, which region slopes away as gradually and is lost in the flattened and shelving upper half of the occiput, below which appears the regularly and smoothly protuberant occipital prominence. The head is a long, narrow oval, and belongs to the Dolichocephali. The base is long and narrow, the face small, and the nasal bones moderately prominent, with a rather sharp line of junction. It is a better formed head than the Assinaboin and Arickaree skulls. The Arickaree approaches it more nearly than the Assinaboin. No. 633, a Cherokee girl, ætat 14 years, which was found with the preceding, has the same general characters, but is not so regularly oval

in contour. The nasal bones are flatter, and the superior maxillary more prominent. The latter bone, singularly enough, somewhat resembles that of a Japanese skull in the collection. The rest of the head is, however, very different. In No. 634, a woman, ætat 20, the receding forehead rises much less regularly and more abruptly towards the vertex. The posterior region as a whole is fuller and rounder, in consequence of the protuberance of the occipital bone being less prominent, and the shelving and flattening of the upper part not so great. The base is fuller posteriorly and less narrow than that of No. 632, approaching in this and some other respects the two Mound heads, presently to be noticed. No. 633 may, in fact, be regarded as intermediate in form and characters between these Mound heads and No. 632. In the characters just mentioned, the two Mound heads (Nos. 1285, 1297) exhibit some differences. The whole head is larger, has a higher internal capacity, and is very roughly marked, the prominences and depressions being particularly well developed. The coronal region is oblong instead of being oval, the forehead flatter, the superciliary ridges strongly displayed, the nasal bones small and incurvated, the alveolar margin of the superior maxillary prominent even to prognathism, malar bones heavy, protuberant and rough; occipital region flatly protuberant, the flatness not being confined to the upper part, but ascribable to the whole occipital region, a feature mainly due to the greater prominence of the superior and anterior portion of the ossa parietalia, the diminished inclination of the posterior part of these bones, and the flat surface presented by the occipital protuberance. The base behind the meati is very broad, the mastoid processes large and heavy, and the lower jaw massive and deep at the symphysis. Still these heads are Dolichocephali.

The crania of the Creek nation exhibit the same peculiar type to which the Chetimache skull belongs, and of which it may be regarded as the standard. No. 441 (Creek warrior from Alabama) is brachycephalic. No. 579, the skull of Athlaha-Ficksa, a full-blood Creek Chief, is somewhat longer, flatter on the top, and less round. Concerning this head, Dr. Morton thus writes: "The broad but low forehead, and the width between the parietal bones, are highly characteristic in this head: a front view is given of it, in order to convey an accurate idea of the osteology of the Indian face.* Thus we see the large and projecting cheek-bones, an arched and prominent bridge of the nose, powerfully developed jaws and remarkably perfect teeth. The distance between the eyes is even greater than is usual, yet the orbits themselves are not large in proportion." No. 751, a Creek woman of Georgia, is a long, oval head with a protuberant occipital boss, and a superiorily flattened occipital region, approximating in some respects the Kimbric skulls in the collection. In No. 1454, a Creek Indian skull of Western Arkansas, the type again varies. The occipital region as a whole is greatly protuberant, yet this prominence is gradually lost in the median line of the crown. In an equally gradual manner the forehead and the sides blend with the coronal region, the most elevated point of which is in the anterior part of the sagittal suture.

The specimens in the collection constituting the Seminole group vary not a little from each other. Some are long, and others short. No. 456 (plate 24 of *Crania Americana*) is a round, high, almost globular head, peaked at the junction of the coronal and sagittal sutures. No. 604 (plate 22 of *Crania Americana*) is a longer head, whose full length I find, upon examination, is not fairly shown in the first wood-cut on page 166 of *Crania Americana*. For the head is more symmetrical, the flatness of the posterior region being more decided on the left than on the right side. It is from the shortened side that the wood-cut is taken. The increased length of the head appears to be mainly due to the very protuberant os occipitis. The crown is less elevated than in the preceding skull. No. 698 is a moderately long and oval head and is more highly

* See Crania Americana, plate 26, for a facial view, and the figures on p. 170, for lateral, coronal and posterior views of this skull.

arched. A slight prominence of the sagittal suture is observed about one inch posterior to the coronal. No. 707 is a shorter skull, and has a full, high forehead, a regularly arched crown, and an occiput full and rounded. No. 708 resembles 698, as do also Nos. 727, 729, 730, 732, 733, 753,* 1105 and 1286. All these are long, oval-shaped heads, with a more or less narrow and prominent occiput, and the coronal region regularly arched antero-posteriorly except in No. 730, in which it is flatter. Nos. 726, 728 and 754 are not quite so long; the occipital region is also broader and less prominent. All the above specimens are from different parts of Florida. It will thus be seen that in this group there are at least two if not three distinct types: a short, high form, to which Nos. 456 and 604 belong, and a long and more or less oval form, which includes all the others.

The three ancient Yamassee skulls, from a mound near Tampa, in Florida, in which they appear to have lain upwards of a century, are all long, narrow and high skulls, belonging to what I call the arched type. They may, in fact, be taken as the standard of this type. In Nos. 1214 and 1215 the outline of the crown is oval; in No. 1216 the oval outline is interrupted by the greater breadth between the parietal tubers.

Two Chetimache skulls, (Nos. 43, 70), one male and the other female, belong to the brachycephalic class. They were exhumed from a cemetery in the Parish of St. Mary, in Louisiana, and were considered by Morton as genuine skulls of the Chetimache tribe. They are angularly round heads, with a recedent forehead, elevated vertex, perpendicularly flattened occiput, and striking breadth between the parietal bosses or ossific centres. The form of these crania is, in many respects, peculiar. It belongs, as far as the general contour goes, to the great short-headed class, in which are arranged the Germans, Finns, Laplanders, Kalmucks, Sclavonians and Turks. But from each and all of these it differs in several respects. The outline of the coronal region resembles a truncated spherical triangle, the base of which coincides with the posterior biparietal diameter. In this respect these heads resemble some of the German crania in the collection. But the latter differ from the former, in the relation which the longitudinal diameter bears to the vertical. In the general globularity of the posterior region, and the proximity of the foramen magnum to the back of the head, the Chetimache cranium resembles the Finnic, Sclavonic and Turkish types, but differs from them in the more recedent and proportionately less broad forehead, which latter feature makes the vertex appear more prominent. Of No. 70, the larger of the two heads under consideration, the reader will find in *Crania Americana*, an excellent lithograph, (plate 19,) together with the following observation from the pen of Dr. Morton:—"The nearly vertical occiput, the great height of the skull, and the size and strength of the bones of the face, are not surpassed by those of any Indian cranium I have seen," (p. 163.)

The young female Choctaw skull (No. 22) is a large, oval, high head with a prominent occiput.

The Euchee cranium (No. 39) is a comparatively short head, with a full, rounded occipital region. In its general form it resembles the Slavic skull.

The collection embraces 26 miscellaneous crania obtained from the mounds in Michigan, Illinois, Wisconsin, Ohio, Tennessee and Florida.

No. 416 is an Indian skull taken from a mound seated on the high bluff which overlooks the Mississippi river, one hundred and fifty miles above the mouth of the Missouri. Morton describes it as "a large cranium, very full in its vertical diameter, and broad between the parietal bones."† It is a good example of what I am disposed to call the arched type. It is dolichocephalic. In its general arched form it resembles the Creek skull, No. 1454. The coronal region closely resembles that exhibited by the Cherokee skull, (No. 634),

* Erroneously numbered 1556 in the printed Catalogue.
† See Crania Americana, p. 221.

already described. There is a difference, however, in the basis cranii, No. 416 having a much greater intermastoid diameter.

No. 1237 is the skull of an Indian woman exhumed near Fort Chartres, Illinois. It is brachycephalic and closely resembles the Chetimache skull, No. 43. The two skulls undoubtedly belong to the same great type. Their calvarial outlines are very much alike; though No. 1237 has a somewhat fuller and less recedent forehead. They have the same shaped orbits and anterior nares, the same small and incurvated ossa nasi, and the same prominence of the superior alveolus. In No. 1237 the bony palate is narrower, and the superciliary ridges are more strongly marked. The bases craniorum are alike.

No. 1315, the skull of an aboriginal American female, found in a saltpetre cave at Golconda, Illinois, belongs to the arched type. It may be ranked with the Dolichocephali. It has a decidedly prognathous, superior alveolus.

No. 1510, male Indian skull taken from an ancient mound in Illinois, belongs to the same type as the Pocasset cranium already referred to. It is a longer and much older head than No. 1315; is more rudely formed, and has the face projecting further forward, in consequence of the prognathic upper jaw.

No. 1511, an Indian cranium found with the preceding, belongs to the same type, but is not so long, and has a flatter and more recedent forehead, and a broader and somewhat shorter face.

On p. 235 of *Crania Americana*, Dr. Morton informs us, that "in the month of May, 1835, a cavern cemetery was discovered on the bank of the Ohio river, opposite to Steubenville. * * * The bones contained therein appear to have been deposited at different periods of time, those on the top being alone in good preservation. They were of all ages, and thrown in indiscriminately after the removal of the flesh; for it is well known that some tribes were accustomed to gather, at times, all the bones of their deceased relatives, and place them in a common receptacle. Of the great number of skulls found in this place but few were perfect; of which last I have received eight. These heads are thoroughly characteristic of the race to which they pertain. They bear no evidence of great age, and no doubt belonged to individuals of the barbarous tribes. Some have thought them Mingoes, who were affiliated to the Iroquois; but the form of the head does not support this surmise. * * * * All these skulls are surprisingly alike—the vertex elevated, the occiput flat, the parietal diameter very great, and the lower jaw massive. They are also of singularly large capacity, and in this respect approach nearer to the Sauks and Foxes, and the Muskogees, than to any other tribes that have come under my notice. The mean internal capacity gives upwards of 85 cubic inches, and the facial angle rises 78 degrees. The anterior chamber gives 38·3 cubic inches, the posterior 49·2; but notwithstanding the proportion of the former, there can be lit le doubt that these skulls belong to the savage tribes, and not to the Toltecan stock."

Of the above skulls, Nos. 420, 436, 437, 438, 658 and 723 resemble each other very closely. They are all, with the exception of No. 438, asymmetrical. This want of symmetry is due to a remarkable flattening of the occipital region, on the left side in Nos. 436 and 437, and on the right in Nos. 420, 658 and 723. There is, consequently, a striking want of correspondence between the antero-posterior or longitudinal diameters of the two sides in each skull. Nos. 438 and 724 are flatter in the crown, and have, therefore, a shorter vertical diameter. All the specimens of this group may be assigned to the same cranial type as exhibited in the Chetimache skull, No. 43. In the Mound skulls, however, the calvarial region is flatter, and has therefore less of the arched form than the Chetimache crania. The occipital region in the former is also broader and flatter. There are facial differences likewise. Nos. 439 and 210 are longer, narrower, more oval and without the occipital flatness. They present nothing of the arched form. In No. 723 the narrowness of the os frontis, the wall-like flatness of the occipital region, and the lowness of the crown combine to produce a singularly triangular form.

No. 53, from a mound at Circleville, Ohio, is a long-head. In general form it is like the Blackfoot cranium No. 1227, but has a more prominent occiput.

No. 1287, from a mound at Chilicothe, Ohio, very closely resembles the Pocasset skull, from which it differs by being somewhat broader. It occupies a position intermediate between the long and short heads. No. 1288, found in the same mound, is a long boat-shaped head with a very protuberant occipital boss.

No. 1512, from a mound in the Scioto Valley, Ohio, is a brachycephalic skull. Of this cranium Dr. Morton thus wrote: "This is, perhaps, the most admirably-formed head of the American race hitherto discovered. It possesses the national characteristics in perfection, as seen in the elevated vertex, flattened occiput, great interparietal diameter, ponderous bony structure, salient nose, large jaws and broad face. It is the perfect type of Indian conformation, to which the skulls of all the tribes from Cape Horn to Canada more or less approximate. Similar forms are common in the Peruvian tombs, and have the occiput, as in this instance, so flattened and vertical as to give the idea of artificial compression; yet this is only an exaggeration of the natural form, caused by the pressure of the *cradleboard* in common use among the American nations."

No. 992, from a mound in Tennessee, resembles No. 1512. It is asymmetrically flattened. It is a short head, with a flat wall-like occiput and a triangular crown. The forehead and whole crown, indeed, are narrower than in No. 1512. It is just such a form as we might suppose the Pocasset type would take if pressed behind.

No. 1271, from a mound near Huron river, Ohio, is a short head with an almost vertically flat occiput. No. 1272, found with the preceding, is a longer and more oval head, with a more rounded occipital region.

No. 1270, from Detroit, is a long, narrow, oval head, resembling, in general form, the Arikaree skulls.

No. 1455, from a mound in Florida, is artificially flattened in such a manner as to resemble somewhat the Chinook or Charib skulls.

No. 212, the cast of a Kenhawha skull, is a short head with a vertical occiput.

No. 1557, from the banks of the Susquehanna river, is a long, oval head with prominent parietal and occipital protuberances.

No. 215, from South Carolina, is brachycephalic. It belongs to the globular, Mongolic form. No. 216 is a long head, as are also Nos. 218 and 219.

No. 134 is a long, narrow, oval and high head, with a prominent occiput. Nos. 136 and 146, from Warren county, Pennsylvania, are both dolichocephalic.

No. 135, found on the brow of a hill about two miles below Trenton, New Jersey, is a long, asymmetrical head. It is probably the skull of a Delaware Indian. The supraorbital ridges are more prominent, however, than in the specimens of the Delaware group. This feature is also exhibited in the fragment, No 249, found in the same locality.

The collection contains four Californian skulls. No. 1514 is the cranium of a California Indian, from a mound near Sacramento City. It is a dolichocephalic head; long and flat; the forehead narrow and low. The calvaria widens out posteriorly to the parietal tubers; the most elevated part of the vertex is on a line coinciding with the greatest interparietal diameter. The posterior part of the parietal bones shelves down to the prominent upper part of the os occipitis. The base is long and oval. The face of this skull is wanting.

No. 1565 is a fragmentary Indian skull, thickly encrusted with carbonate of lime. It was found in a cave in Vallecita, Calaveras Co., California, along with 300 other human crania, all embedded in limestone. It has the same general appearance and conformation as the preceding skull. The occiput is, however, more prominent, and the contour of the more angular crown approaches a lozenge-shaped oval. The calcareous incrustation extends, in some places, to the depth of an eighth of an inch.

In the south-western part of the North American continent lies an extensive tract of country designated by Prichard, Latham and other systematic ethnologists as the Paduca area. This ethnological region extends, according to Latham, from the Pacific ocean, in a south-eastwardly direction, to the Gulf of Mexico; from the water-system of the river Columbia to that of the Sabine river, and from north of 45° N. L., to south of 25° S. L. It is occupied by numerous, imperfectly known and unclassified tribes to whom the term Paduca has been applied provisionally. The tribes of this group represented in the collection are the Shoshonis or Diggers, Utahs, Moquis, Apaches, Navajos, Lipans, Camanches, and that race of people which, though seemingly now extinct, once formed the numerous population of the large towns, long since in ruins, such as Quivira, Abo, Guarra, Pecos. &c.

The Shoshoni, or Root-Digger skulls, three in number, vary in form. No. 1446, obtained on the Trucky river, in the California mountains, belongs to a peculiar form or type of which examples have already been pointed out in the Pocasset, Narragansett and other tribes. It is, however, a broader skull. The crown approaches the triangular form; the forehead is rather broad and flat. The whole crown rises up to a sort of eminence situated between the parietal bosses. The occipital region is broad and rather flat, the basis cranii broad and rounded. Nos. 1447 and 1449 are long heads. They differ in the form of the crown, which in No. 1449 is a long, regular oval, but in No. 1447 is flat and broad posteriorly between the parietal tubers. No. 1449 resembles somewhat the Arickaree form in both the occipital region and the basis cranii. No. 1447, in consequence of a greater projection of the occiput, exhibits the supero-occipital flatness of the Swedish form.

Of this group Dr. Morton thus wrote: "Two of these skulls are so small, so receding in the forehead, and so depressed over the whole coronal region, that they could not, by intrinsic evidence alone, have been identified with any branch of the aboriginal American race. They want the vertical occiput and general rounded form of the Indian head, and have a narrowness of the face unusual with these people."*

No. 1448, from the Eastern slope of the Sierra Nevada, and recorded in the catalogue as pertaining to none of the Shoshoni tribes, is a large, massive, heavy head, rudely developed. In the median line the crown runs back to an elevation similar to that seen in the Potawatomie skull (No. 657) figured by Morton; from this prominence descends a broad and almost perpendicularly flat occipital region. Hence, when viewed in profile, the skull has a quadrangular appearance. This ponderous head, which Dr. Morton termed "the very type of Indian conformation," differs decidedly from Nos. 1447 and 1449, and resembles No. 1446.

In November, 1855, Dr. Thomas J. Turner, while at Mare Island, California, dug up two skulls which he supposed to be those of Digger Indians. They were buried under a mass of calcined shells, some seven feet below the surface. One of these crania, No. 1027, is that of a female in all probability, and is the *fac-simile* of the Shoshoni skull No. 1449. It is a long, narrow head with an oval occiput. The other skull, No. 943, is a long, high head, differing considerably from No. 1027 and all the specimens grouped in the catalogue as Shoshonees. Nos. 1446 and 1448 should evidently be classed together as belonging to one tribe, while Nos. 1447, 1449 and 1027 clearly belong to another group.

The skull of a young Utah girl (No. 140) is dolichocephalic, with prominent occipital and parietal protuberances, and a rhomboidal crown.

Two Moqui crania, Nos. 138 and 139, are small, non-symmetrical heads. Both have the posterior region flattened; the one slightly, the other decidedly. No. 138 exhibits the shelving, parieto-occipital flatness; the other, No. 139, has the back of the head almost vertically flattened. No. 139 is brachycephalic;

* Proceed. Acad. Nat. Sci., vol. iv. p. 75.

the other may be said to be mesocephalic. In No. 138 the occipital protuberance is well marked; in No. 139 this protuberance is nearly obliterated.

Three crania from Quivira and Quarra, New Mexico, (Nos. 1032, 1033 and 1034), are brachycephalic. The occiput in all is more or less flattened, but most decidedly in No. 1032.

A Pueblo cranium (No. 930) is dolichocephalic with shelving occipital flatness. Another Pueblo skull (No. 937) is short, high, and non-symmetrical.

A skull from Santa Fe (No. 931) is a short, asymmetrical and occipitally flattened head.

No. 1346, the skull probably of an ancient tribe of Lipan Indians, from the celebrated, sepulchral cavern of Bolson de Massimi, between San Sebastian and San Lorezo, in the State of Durango, New Mexico, is a long, oval head with a very prominent occiput. No. 1345, the cranium of a modern Lipan, is shorter and has a somewhat more rounded occiput.

The skull of a very young Apache child (No. 141) is dolichocephalic, and in its general form very much like the Utah cranium, No. 140. No. 145, the skull of a Mescalero Apache Indian, from the Desert of Black Hills, Texas, recently added to the collection, is a long oval and very symmetrically formed head, with protuberant occipital and parietal protuberances. It also resembles No. 140. No. 1035, the skull of a Mescalero Chief, is an oblong, barrel-shaped head with a rounded occiput and broad base. No. 935, a Mogoyon Apache, is a long, high head, very broad between the mastoid processes. No. 936, the cranium of a Navajo Indian, is a long, ponderous, broadly oval head with a broad base, a broad, high and almost vertical forehead, and a flattened posterior region. In its general form it resembles somewhat Nos. 1446 and 1448 of the Shoshoni group.

No. 247 is the skull of a Camanche Indian, supposed to be that of "Yellow Wolf," head chief of his nation. It was found in a very conspicuous tomb, in a large Indian burial ground, on the head-waters of the Colorado River, near the deserted Fort Phantom Hill, Texas. It is a dolichocephalic cranium, of the arched type.

No. 34, a Mexican Indian from Acapancingo, eighteen leagues south of Mexico, and referred by Morton to the Tlahuica tribe, is a dolichocephalic, prognathic female skull.

No. 734, a male skull exhumed near the Indian village of Guahapan, on the mountain Popocatapetl, is mesocephalic and broadly oval. No. 735, a female skull found with the preceding, is a long head of the arched type. These two crania were regarded by Dr. Morton as probable examples of the ancient Aztec nation.

Three skulls from an ancient cemetery at Otumba differ in form; Nos. 714, a male, and 716, a female, are dolichocephalic. The first, however, forms a broad oval, while the second belongs to the arched type. No. 715 is brachycephalic and globular.

Nos. 717, 718 and 720 are ancient Mexican crania from Tacuba. The first belongs to the arched, the second to the cubical, and the third to the broadly oval type. The first two have pyramidal faces. No. 718 is brachycephalic and carinated also. Nos. 717 and 720 are dolichocephalic.

The Otomie skulls are, for the most part, dolichocephalic. No. 1323, the cranium of Vicente Rivaz, an Ottomie Cazique of the pure Mexican race, is a narrow oval in form. No. 1001 is arched. No. 1002 is phoxocephalic, with a very protuberant occiput.

No. 1004, the skull of an ancient Mexican of the Tlascalan nation, is brachycephalic and globular.

No. 1005, a woman of the Chechemecan nation is mesocephalic and arched.

No. 681, a Mexican woman of the Pames tribe, is intermediate between the long and short heads, and is phoxocephalic. Another female skull of the same tribe, No. 1313, is a broadly oval dolichocephalus.

No. 1314, exhumed from an ancient cemetery at Cerro de Quesilas, near the

[May,

city of Mexico, and regarded by Dr. Morton as a relic of the genuine Toltecan stock, is a mesocephalic, male skull, with a broad and flat vertex. It resembles somewhat the Maya cranium referred to below.

Nos. 682, 234, 1353 and 1566 are brachycephalic and cubical. No. 1515, a modern Mexican Indian cranium, is intermediate in length and phœnocephalic.

Nos. 1347, 555, 557, 558 and 689 are dolichocephalic and broadly oval. No. 556 is also dolichocephalic, but belongs to the arched type. It has a mammillated occipital protuberance.

The skull of a Maya Indian of Yucatan, No. 990, is dolichocephalic, and broadly oval, with a very flat crown and prognathic jaws.

The Araucanian female crania, Nos. 651 and 652, are long, broadly oval heads. The sides and occipital region being slightly flattened and not rounded, give a certain angularity or squareness to these heads,—a feature which is more marked in another female skull of this group, No. 654, on account of the very flat vertex. No. 655, a male cranium, is a longer oval, with a somewhat more prominent occipital region. No. 656, a female skull, resembles somewhat the form exhibited by the Pocasset head. No. 995, also a female, has a higher vertex, and is more protuberant in the upper half of the occipital bone. No. 997, a male skull, exhibits the arched type. Nos. 221 and 222 are arched like the Yamassee skulls.

The only unflattened Charib skull in the collection, No. 692, is a long, moderately high and broadly oval skull. No. 638 and a cast, No. 225, though compressed or flattened heads, evidently belong to the Dolichocephali.

The Brazilian crania are all dolichocephalic. The Tapuyo skull, No. 1254, is a large, long and broadly oval cranium. Three other Brazilians, Nos. 1513, 1528 and 1529 are long, oval heads more or less prominent behind. The Guaycurú skull No. 1530 is also long and oval in form, with a prominent occiput. Nos. 1555 and 1556, two Gentoo skulls from the Purus River, a tributary of the Amazon, are small, oval dolichocephalic crania.

The collection contains a cast of the skull of a Patagonian, and another of the head of a Puelche girl. The former, No. 1357, (of which No. 226 is a duplicate), is large, long and cylindrical or barrel-shaped in form. The latter, No. 1359, is a high, short and broad head with a flat, occipital region.

Of the 245 Peruvian crania belonging to the Academy's collection, 50 are dolichocephalic and 168 brachycephalic; while the remaining 27 fall into the mesocephalic or intermediate class rather than into either of these two extremes. To the elongated or dolichocephalic form belong all the specimens from Arica enumerated on pages 76, 77 and 78 of my *Catalogue of Human Crania*, together with nine others from the same locality, added to the collection since the publication of the catalogue. These skulls are artificially distorted, and are referrible to one or another of the grotesque forms exhibited in plates 2, 3, 4 and 5 of the *Crania Americana*. The Arica skull, No. 932, is brachycephalic. To the long-headed class belong also the following, viz: Nos. 415, 1048, 1417 and 1445, from Pisco; No. 231, from Lima; No. 11, an ancient Chimuyan, from Truxillo; No. 637, a Quichua of upper Peru; No. 1517, a child from Payta; No. 232, from Atacames; the casts (Nos. 700, 701, 702, 703, 704, 705, 710 and 711) of ancient Peruvian crania from Titicaca, Coracolla, Pometé and Chimgaugé; and Nos. 940, 941 and 942 from the ruins of old Callao. In Nos. 1048, 1417 and 231, we again meet with examples of the narrow, oval form or type; in Nos. 1445, 11, 232, 940 and 942, of the broad oval; and in Nos. 637, 1517 and 941, of the upsicephalic or arched form.

Ninety-three skulls from Pachacamac are Brachycephali; eleven others, Nos. 402, 409, 571, 631, 696, 1453, 1457, 1462, 1467, 1489 and 1499, are mesocephalic. Of these latter, Nos. 571, 631, 696, and 1499, may be referred to the arched form. Had the process of growth and development not been interfered with in No. 76 by artificial means, this skull would have been a broadly oval Dolichocephalus. In the brachycephalic group must also be arranged all

the crania from Pisco, except three—Nos. 445, 1048 and 1445—which are dolichocephali; and four—Nos. 1061, 1326, 1369 and 1423—which are mesocephali and all referrible to the arched form. Another series of Peruvian crania, collected at Paracas Bay by Dr. Turner, (Nos. 1298, 1273, 1274, 1275, 1303, 1304, 1305, 1025 and 1026, none of which are recorded in my printed *Catalogue*), belong likewise to the Mesocephali and to the phoxocephalic group of the arched form or type. All the skulls from Santa are brachycephalic, as are also all from Lima, except No. 231, which is a long-head, and No. 68, which is a broadly oval mesocephalus. No. 451 is also mesocephalic and arched. Nos. 1518, from Payta, 1046 from Guamay, 447, 448 and 233 from Callao are brachycephalic.

From the above statements it will be seen that among the Peruvian crania in the Academy's collection the Brachycephali are greatly in numerical excess over the long and middling long-heads. As regards their type or ethnic form they may all be placed in the kubicephalic or square-headed group.

As a summary of the more prominent facts recorded in the preceding pages, and in order to exhibit as distinctly as possible the leading differential characters of the American Indian crania contained in the museum of the Academy, I have constructed the following tables, and attempted therein to classify these crania according to their length as compared with their heighth and breadth, and according to their general ethnic forms or types. Grouping them in this manner is essentially preliminary to comparing them with corresponding groups of skulls of the old world. Such a comparison I purpose to institute in a future monograph to be devoted to the consideration of the large collection of Esquimau skulls referred to above.

In the first table the American races represented in the collection are grouped in accordance, for the most part, with the philological arrangement or classification of Latham, while their crania are arranged in dolichocephalic mesocephalic and brachycephalic classes. In the second table these skulls are classified with especial reference to the more prominent of the ethnic or typical forms exhibited by the entire series. This classification must not be regarded, however, as rigidly accurate. It is provisional only, as all such classifications must necessarily be, and subject, therefore, to future revision. Large as is the collection of American skulls now under consideration, it is, nevertheless, exceedingly defective. With the exception of the Peruvians and, next to these, the Seminoles and Esquimaux, the specimens representing the different tribes are but few in number, and of the identity of some of these I am not yet perfectly satisfied; moreover there are many well-known tribes and races of which the collection contains not a single cranial specimen. Though the collection is not sufficiently diversified to exhibit all the probable cranial forms of the aboriginal Americans, it is ample enough to show that among these people there are long, short and intermediate heads divisible into pyramidal, oval, cylindrical, arched, wedge-shaped, flat, globular, cubical, prognathic and other forms, all as different from each other as are the distinct types of the old world. In assigning the skulls to these typical groups or classes I have experienced the usual difficulty in locating the transitionary or aberrant forms, which are always, in large collections, more or less numerous, and which often effectually obliterate all sharply-draw lines of demarcation. Future examinations and comparison may cause these transitionary specimens to be transferred from, groups in which I have at present placed them to others; but this transposition though it may ultimately lead to the establishment of other types, can in no case diminish the stability of those which I have just indicated. These groups, by means of the intermediate forms, graduate into or blend with each other, and we are thus admonished here, as in other departments of natural history, of nature's eternal enigma of a certain undefinable, serial unity pervading and co ordinating an endless diversity of forms.

Table I. *Classification of Aboriginal American Crania according to length.*

I. Dolichocephali.	II. Mesocephali.	III. Brachycephali.
Long skulls more or less oval: with more or less protuberant occiputs.	Skulls intermediate in length, with broadly oval, triangular or quadrangular crowns: the occiput generally rounded or rather flat.	Short skulls with rounded base, and globular, or more or less vertically flattened occiputs.
	A. *Esquimaux Group.*	
Esquimaux, Nos 1558, 1559, 1560, 1561, 1562, 1563, 674, 675, 676, 677, 678, 679, 200.		
	B. *Athapascan Group.*	
		Tlatskanai, No. 577.
	C. *North-west Coast Group.*	
Chimseyan, No. 987.		Nisqually, No. 208.
Naas, Nos. 213, 214.		Suquimmish, Nos. 944, 946, 1013, 1014.
Chinooks (?), Nos. 457, 578.		Kawichin, No. 1015.
		Kowalitsk, No. 573.
		Killemook, No. 576.
		Klikatats, Nos. 207, 461.
		Kalapuya, No. 574.
		Chinooks, Nos. 462, 641, 721, 1349, 1350.
		Klatsops, Nos. 203, 575.
	D. *Kootenay Group.*	
Kootenays, Nos. 744, 745.		
	E. *Pawnee Group.*	
Pawnee, No. 1043.	Pawnee, No. 540.	
Arikaras, Nos. 649, 748, 949.		
	F. *Dacota Group.*	
Minetaris, Nos. 650, 746, 747, 749.		
Assinaboins, Nos. 659, 1230, 1231.		
Mandans, Nos. 643, 644, 738, 739, 740, 741, 742.		
Dacotas or Sioux, Nos. 204, 112.	Dacota, No. 605.	
	Osage, No. 660.	Osage, No. 54.
	Ottoes, Nos. 755, 757.	Ottoes, Nos. 756, 758.
Aubsarokes, Nos. 1228, 1229.		
Winnebago, No. 560.		Winnebago, No. 559.
	G. *Algonkin Group.*	
Massasauga, No. 27.		
Penobscots, Nos. 89, 105.	Quinnipiak Mohegan, No. 26.	
	Pocasset, No. 1036.	
Narragansetts, Nos. 950, 951, 952, 954, 955, 957, 1040.	Narragansetts, Nos. 693, 953, 656.	

Naumkeag, No. 567.		
Naticks, Nos. 104, 107, 110.	Naticks, Nos. 103, 401.	
Lenni-Lenapés or Delawares, Nos. 40, 115, 118, 418, 1264, 1265, 135, 136, 146.	Lenni-Lenapé, No. 998.	Lenni-Lenapés, Nos. 205, 206, 1263.
Nafiticoke, No. 1219.		
Mingo, No. 455.		
Ottawas, Nos. 1008, 1009	Ottawa, No. 1006.	Ottawa, No. 1007.
Menominees, Nos. 44, 78, 1220, 1222.	Menominees, Nos. 35, 454.	Menominee, No. 563.
Chippewas, Nos. 683, 684.		
Miamis, Nos. 106, 407, 541, 542, 1052, 1053, 1054, 1055, 1056, 1057.	Miamis, Nos. 1058, 1233.	
	Illinois, No. 1010.	
Ottigamie, (half-breed,) No. 415.		Ottigamies, Nos. 209, 639, 694.
Pottawotomies, Nos. 657, 737, 1322.		Pottawotomie, No. 736.
Sauks, Nos. 561, 1246.		
Shawnees, Nos. 606, 1210.		Shawnee, No. 691.
Shyennes, Nos. 939, 1041.		
	Blackfoot, No. 1227.	

H. *Iroquois Group.*

Iroquois, Nos. 16, 119, 989.		
Mohawks, Nos. 895, 896.	Mohawk, No. 897.	
Oneida, No. 33.		
Seneca, No. 1516.		
Cayuga, No. 417.		
Huron, No. 607.	Hurons, Nos. 15, 1218.	Huron, No. 1217.

I. *Cherokee Group.*

Cherokees, Nos. 632, 633, 634, 635, 1285, 1297.		

J. *Choctaw Group.*

Choctaw, No. 22.		
Creeks, Nos. 751, 1454.	Creek, No. 579.	Creek, No. 441.
Seminoles Nos. 698, 707, 708, 727, 729, 730, 732, 733, 753, 754, 1105, 1286.	Seminoles, Nos 604, 726, 728.	Seminole, No. 456.

K. *Unclassified Group.*

	Yamassees, Nos. 1214, 1215, 1216.	
	Euchee, No. 39.	
		Chetimaches, Nos. 43, 70.
		Natchez, Nos. 102, 1106.

L. *Paduca Group.*

Shoshonees, Nos. 1447, 1449, 943, 1027.	Shoshonees, Nos. 1446, 1448.	
Utah, No. 140.		
	Moqui, No. 138.	Moqui, No. 139.
Pueblo, No. 930.		Pueblo, No. 937.

		Santa Fé, No. 931.
		Ancient Tribes of New Mexico, Nos. 1032, 1033, 1034.
Lipans, Nos. 1345, 1346.		
Apaches, Nos. 141, 145, 935, 1035.		
Navajo, No. 936.		
Camanche, No. 247.		
Tlahuica Mexican, No. 34.		
Aztec ? No. 735.	Aztec ? No. 734.	
Mexicans (Otumba,) Nos. 714, 716.		Mexican (Otumba,) No. 715.
Mexicans (Tacuba,) Nos. 717, 720.		Mexican, No. 718.
Mexicans (Otomie,) Nos. 1323, 1001, 1002.		
	Chechemecan, No. 1005.	Tlascalan, No. 1004.
Pames Mexican, No. 1313.	Pames Mexican, No. 681.	
	Ancient Mexicans, Nos. 1226, 1314.	
Modern Mexicans, Nos. 1347, 555, 556, 559, 558, 722.	Modern Mexican, No. 1515.	Mexicans, Nos. 682, 234, 1353, 1566.

M. Mound Group.

Nos. 53, 134, 210, 216, 218, 219, 416, 1270, 1272, 1288, 1315, 1510, 1511, 1514, 1557, 1565.	Nos. 439, 1051, 1271, 1287.	Nos. 211, 212, 215, 420, 436, 437, 438, 658, 723, 992, 1237, 1512, 1455

N. Central and South American Group.

Maya, No. 990.		
Charibs, Nos. 225, 638, 692.		
Brazilians, Nos. 1513, 1528, 1529.		
Tapuro, No. 1254.		
Guaycuru, No. 1530.		
Gentoos, Nos. 1555, 1556.		
Araucanians, Nos. 221, 222.	Araucanians, Nos. 651, 652, 654, 655, 656, 995, 997.	Araucanian, No. 120.
Patagonian, No. 1357.		Puelche, No. 1359.
Peruvians—	Peruvians—	Peruvians—
From Arica, 29 crania.	From Arica, No. 932.	From Pisco, 55 crania.
" Pisco, Nos. 415, 1048, 1417, 1445.	" Pisco, 4 crania.	" Pachacamae, 93 crania.
From Lima, No. 231.	From Lima, No. 68.	From Santa, 8 crania.
" Payta, No. 1517.	" Paraccas Bay, 9 crania.	" Lima, 5 crania.
" Atacames, No. 232.	From Pachacamae, 11 crania.	From Payta, No. 1518.
From Callao, Nos. 940. 941, 942.	Of unknown origin, No. 451.	From Guamay, No. 1046.
From Titicaca, Coracolla, &c., 8 casts.		From Callao, Nos. 447, 448, 233, 132.
Chimuyan, No. 11.		Of unknown origin.
Quichua, No. 637.		

Table II. *Classification of Aboriginal American Crania according to their Ethnic Forms.*

A. Pyramidal or Pyramidocephalic* Form.

General Characters: Dolichocephalic; calvaria carinated and pyramidal; face lozenge-shaped and broadest below the orbits.

Esquimaux, Nos. 1558, 1559, 1560, 1561, 1562, 1563, 674, 675, 676, 677, 678, 679, 200.

B. Oval or Öoidocephalic† Form.

General Characters. Chiefly dolichocephalic; vertex and base of the skull more or less oval in outline. This oval generally regular, sometimes rhomboidal or angular; sometimes long and narrow, sometimes rather short and broad. Occipital region more or less full and prominent; occasionally very much elongated. Occipital protuberance sometimes knob-like, sometimes acuminated. Posterior portion of the ossa parietalia shelving downwards and backwards like an inclined plane; a portion of this plane sometimes formed by the upper half of the occipital bone. Forehead moderately well developed in breadth and heighth.

Subdivisions. 1. Cymbecephalic or boat-shaped form, in which the occiput is exceedingly protuberant. 2. Narrow oval form. 3. Broad oval form. 4. Barrel-shaped or cylindrical form. 5. Angularly oblong form. 6. Artificially elongated form.

I. *Cymbecephalic Form.*

Arickaree, No. 649.
Cherokee, No. 632.
Miamis, Nos. 1052, 1053, 1054, 1055, 541.
Kootenay, No. 744.
Lenni-Lenapé, No. 40.
Mandan, No. 738.
Seminole, No. 733.
Minetaris, Nos. 650, 746.
Creek, No. 751.
Dacota, No. 112.
Pawnee, No. 1043.
Cayuga, No. 417.
Narragansett, No. 951.
Mound skull, No. 1288.

II. *Narrow Oval Form.* (Stenocephalic.)‡

Arickarees, Nos. 748, 949.
Mandans, Nos. 643, 644.
Cherokees, Nos. 633, 634, 635.
Kootenay, No. 745.
Naas, No. 214.
Lenni-Lenapés, Nos. 115, 118, 418, 1264, 1265.
§ Miamis, Nos. 1056, 1057.
§ Iroquois, Nos. 16, 119, 989.
Minetaris, Nos. 747, 749.
Narragansetts, Nos. 950, 952, 954, 955.
Chocta, No. 22.
Lipan, No. 1346.
Peruvians from Pisco, Nos. 1048, 1417.
Peruvian from Lima, No. 231.
Gentoos, No. 1555, 1556.
Penobscot, No. 105.
Seminoles, Nos. 727, 729, 730.
Shawnee, No. 606.
Massasauga, No. 27.
Upsarookas, Nos. 1228, 1229.
Illinois, No. 1010.
Mowhawks, Nos. 895, 896.
Natick, No. 107.
Shoshones, Nos. 943, 1027, 1449.
From the Mounds, No. 1270.
Miscellaneous, Nos. 134, 218, 219, 1557.

* Πυραμίδος, Κεφαλὴ.
† Ωοειδ. Εἶδος, Κεφαλὴ.
‡ Στενὸς, Κεφαλὴ.
§ These five crania form the transition to the arched form.

III. *Broad Oval Form.* (Eurycephalic.)*

Assinaboins, Nos. 659, 1230, 1231.
Naas, No. 213.
Mandans, Nos. 739, 740, 742.
Menominees, Nos. 78, 1220, 1222.
Miami, No. 407.
Pottawotomie, No. 737.
Winnebago, No. 560.
Chinook, (normal form,) No. 578.
Chimseyan, No. 987.
Creek, No. 579. Shorter and more broadly oval than the Assinaboins, between which and the brachycephalic Creek skull, No. 441, it forms the transition.
Ottoe, No. 757.
Ottawa, No. 1008.
Seminoles, Nos. 754, 708.
Utah, No. 140.
Pueblo, No 930.
Apaches, Nos. 141, 145.
Lipan, No. 1345.
Peruvian from Pisco, No. 1445.
Chimuyan, No. 11.
Peruvian from Atacames, No. 232.
Peruvians from Callao, Nos. 940, 942.
Peruvian from Lima, No. 68.
Naticks, Nos. 104, 401.
Sauks, Nos. 561, 1246.
Mingo, No. 455.
Dacota, No. 204. Departure from Assinaboins. Stands between it and the Creek skull, No. 1454.
Ottigamie, (half-breed,) No. 415.
Shyenne, No. 939.
Euchee, No. 39.
Californians, Nos. 1514, 1565.
Miscellaneous, No. 216.
Maya, No. 990.
Tapuro, No. 1254.
Guaycuru, No. 1530.
Charibs, Nos. 638, 692.
Araucanians, Nos. 651, 652, 654, 655.
Brazilians, Nos. 1513, 1528, 1529.

IV. *Barrel-shaped or Cylindrical Form.* (Cylindricephalic.)†

Patagonian, No. 1357.
Narragansett, No. 1040.
Apache, No. 1035.

V. *Angularly Oblong Form.*

Shoshone, No. 1447.
Natick, No. 107.

VI. *Artificially Elongated Form.*

Peruvians from Arica, 29 crania.
Peruvians from Titicaca, Corocolla, &c., 8 casts.

C. Arched or Hypsicephalic‡ Form.

General Characters. Generally dolichocephalic; high or vertically elevated skulls. Forehead high; vertex or coronal region sometimes curving from the glabella to the occipital protuberance, so as to form a more or less regular arch, as in the *Archencephali;* sometimes running up to an elevated point at the junction of the coronal and sagittal sutures as in the *Phoxocephali.*

I. *Archencephali.*§

Seminoles, Nos. 707, 726, 1286.
Shoshone, No. 1448.
Seneca, No. 1516.
Pottawotomies, Nos. 657, 1322.
Oneida, No. 33.
Cherokees, Nos. 1285, 1297.
Chippewas, Nos. 683, 684.
Blackfoot, No. 1227.
Shawnee, No. 1210.
Huron, No. 607.
Ottawa, No. 1009.
Naumkeag, No. 567.
Moqui, No. 138.
New Mexico, No. 1033.
Menominee, No. 44.
Osage, No. 660.
Penobscot, No. 89.
Mounds, Nos. 416, 1315, 210, 439, 1272, 53.
Minsi (Lenapé,) No. 998.
Narragansett, No. 953.
Araucanians, Nos. 221, 222, 995, 997.
Yamassees, Nos. 1214, 1215.
Quichua, No. 637.
Peruvian of Payta, No. 1517.
Peruvian of Callao, No. 941.
Peruvians from Pisco, Nos. 1061, 1326, 1369, 1423.

* Ευρυς. Κεφαλη.
† Κυλινδρικος, Κεφαλη.
‡ Υψοι, Κεφαλη.
§ Αρχη Κεφαλη.

II. *Phoxocephali.**

Seminoles, Nos. 604, 698, 732, 753, 1105.
Hurons, Nos. 15, 1218.
Shyenne, No. 1041.
Mandan, No. 741.
Ottoe, No. 755.
Ottawa, No. 1006.
Creek, No. 1454.
Narragansetts, Nos. 956, 957.
Naticks, Nos. 103, 110.
Camanche, No. 247.
Peruvians from Pachacamac, Nos. 571, 631, 696, 1499.
Peruvians from Paracas Bay, Nos. 1298, 1273, 1274, 1275, 1303, 1304, 1305, 1025 and 1026.

D. Wedge-shaped or Sphenocephalic† Form.

General Characters. Chiefly mesocephalic or intermediate in length between the dolichocephali and brachycephali. Forehead more or less recedent; crown triangular in shape, narrow at the forehead and wide between the parietal protuberances. Back of the head more or less flat, and pressed in towards the foramen magnum. Constitutes the transition to the square-headed brachycephali.

Pocasset, No. 1036.
Menominee, No. 35.
Narragansett, No. 693.
Shoshone, No. 1446.
Yamassee, No. 1216.
Araucanian, No. 656.
Mound crania, Nos. 1510, 1511, 1287.
Chinook (normal form,) No. 457, approaches this type.

E. Flat or Platycephalic Form. (*Subglobular.*)

General Characters. Chiefly mesocephalic like the preceding group, with flat vertex, and rounded occiput. Transitionary to the round-headed or globular brachycephali.

Pawnee, No. 540.
Dacota, No. 605.
Mohawk, No. 897.
Seminole, No. 708.
Miamis, Nos. 1058, 1233.

F. Globular or Sphaericephalic‡ Form.

General Characters. Brachycephalic; vertex, occipital region and base rounded or globular. Occiput sometimes rather flat.

Ottawa, No. 1007.
Ottigamie, Nos. 639, 694, 209.
Pottawotomie, No. 786.
Winnebago, No 559.
Missouri, No. 211.
Menominee, No. 563.
Mound, No. 420.
Miscellaneous, No. 215.
Ottoe, No. 756.
Mohegan, No. 26. } Transition from
Nanticoke, No. 1219. } broad ovals.
Seminole, No. 456. Transition from arched form.
Huron, No. 1217.
Moqui, No. 139.
New Mexico, No. 1034.

G. Square, Cuboidal or Cubicephalic§ Form.

General Characters. Brachycephalic. Occiput vertically flattened, or nearly so.

Chetimaches, Nos. 43, 70.
Creek, No. 441.
Lenni-Lenapés, Nos. 205, 206, 1263.
Osage, No. 54.
Ottoe, No. 758.
Shawnee, No. 691.
Kenhawhs, No. 212.
Puelche, No. 1359.
Mounds, Nos. 436, 437, 438, 658, 723, 992, 1237, 1271, 1512.
New Mexico, No. 1032.
Pueblo, No. 937.
Santa Fe, No. 931.
Peruvians from Pachacamac, 93 crania.
Peruvians from Pisco, 55 crania.
Peruvians from Santa, 8 crania.
Peruvians from Lima, 5 crania.
Peruvians from Payta, Guamay and Callao, Nos. 1518, 1046, 447, 448 and 233.

* Φοξος, Κεφαλη.
† Σφην, Κεφαλη,
‡ Σφαιρικος. Κεφαλη.
§ Κυβικος, Κεφαλη.

H. PROGNATHIC OR NEGROID FORM.

Lenni-Lenapé, No. 40.
Narragansett, No. 953.
Maya, No. 990.

From the foregoing statements and from a careful examination of the preceding tables we may conclude:

1st. That the crania of the Aboriginal Americans are divisible into Dolichocephalic, Mesocephalic and Brachycephalic groups.

2d. That the Dolichocephali greatly preponderate in numbers over the Mesocephali and Brachycephali.

3d. That in the case of the Peruvian skulls in the Academy's collection, however, the short, square heads are more numerous than the elongated forms.

4th. That in North America neither the Dolichocephalic nor Brachycephalic tribes, when first known to Europeans, were restricted in their geographical distribution to any particular locality. While the former were scattered over the continent, through all degrees of latitude and longitude; the latter appear to have been, if we may judge from the specimens in the Museum, more numerous about the Great Lakes, at various places in the interior, in the south near the Gulf of Mexico, in the so-called Paduca area, and especially along the north-west coast. In general terms we may say that on the eastern or Atlantic side of the continent the Dolichocephali appear to have prevailed; and on the western or Pacific side the Brachycephali. This in a great measure seems to have been, and still is the case in South America.

5th. That long and short-headed tribes or races are very commonly found throughout the two Americas side by side. In the extreme north, for example, dolichocephalic and brachycephalic forms are contrasted in the Esquimaux and their geographical neighbors, the Konaegi or Kadiakan Aleutians; and again in the far south these diverse forms are exhibited in the Patagonians and Puelches.

6th. That this contrast in cranial forms existed among the extinct races of America, as it now does among extant tribes.

7th. That in comparing the old and new worlds by their cranial forms, we find that while in Europe and Asia the brachycephalic is the prevalent form, in North America the dolichocephalic is the predominant type.

8th. That while in Africa all the people are dolichocephalic, in South America they are nearly equally divided between the long and short forms.

9th. That while in Europe and Asia the Polar or Arctic people are chiefly brachycephalic, in America they are wholly dolichocephalic.

10th. That various European, Asiatic and African crania, such as those of Norwegians, Swedes, Anglo-Saxons, the Germanic or long-headed Germans, the Gothic or short-headed Germans, the Finns, Lapps, Turks, Sclavonians, Kalmucks, Burats, Prognathic Negroes, &c., find representatives among the native cranial forms of America.

11th. That this homoiocephalic representation is not confined to normal skull-forms, but is shown in abnormal or artificially distorted skulls also.

12th. That the Dolichocephali are divisible into at least six well-marked forms or types, viz.: the pyramidal, boat-shaped, oval, cylindrical oblong and arched.

13th. That the Brachycephali may be divided into round or globular, and square or cuboidal classes.

14th. That the Mesocephali also consist of two sub-groups, one of which is transitionary to the square or cubical, and the other to the round or globular Brachycephali.

15th That these ethnical or typical groups are founded upon osteological differences as great, and apparently as constant, as those which, in Europe, suffice to separate the Germanic and Celtic stocks on the one hand, from the Ugrian, Turkish and Sclavonian, on the other.

On the Introduction of the American SHAD into the Alabama River.

BY W. C. DANIELL, M. D., OF SAVANNAH, GEO.

(Communicated through the Smithsonian Institution.)

My success in establishing the White Shad in the Alabama River being now complete, I propose to give you a detailed statement of the matter.

Having long doubted, the generally received theory of the annual migration south from the northern seas, of the White Shad, and of the consequent annual migration thither of the young fry hatched from the eggs deposited by their parents in our fresh water streams, I made inquiry of our fishermen, and learned that minute but distinctive differences were readily detected between the White Shad taken in the Savannah River and those taken in the Ogeechee River, eighteen miles south of the Savannah River. Fully satisfied of this fact, I readily concluded that the young shad that descend to the sea never go so far from the mouth of the river descended, as to lose their connection with it, and that they ascend in the spring the same river which they had descended as young fish the previous summer. Then the feeding ground, so to speak, of the shad is in or near the mouth of the river. If the young shad does attain its growth at the mouth of the Savannah and of the Ogeechee Rivers, may there not be equally good feeding-grounds at the mouths of the Alabama and other rivers flowing into the Gulf of Mexico? To solve this question, I, with the aid of my friend Mark A. Cooper, Esq, whose residence on the Etowah River in Barton County supplied an eligible locality for the experiment, in the early summer of 1848 had placed in a small tributary of the Etowah River the fecundated eggs of the White Shad, which I had myself carefully prepared at my plantation on the Savannah River, ten miles above this city, from living parents. These eggs, so deposited by Major Cooper, were daily visited by him until they had all hatched. I sent another supply of fecundated eggs to Dan'l. Pratt, Esq., at Prattsville, near Montgomery, Ala., in 1853 or '54, as he writes me, which he deposited in a small creek. Inasmuch as he left home soon after, and was absent "some weeks," he can only report that during that absence heavy rains raised the waters in the creek, and washed away the "pen" in which he had placed the White Shad eggs supplied by me. Nothing can therefore be safely affirmed of the success of this second deposit, nor is it important, as in 1851 or '52 the White Shad had already been taken in the fish-traps at the foot of the Falls of the Alabama, at Witumka, and of the Black Warrior, near Tuscaloosa, though unknown to me at the time of supplying Mr. Pratt with the fecundated eggs.

Through the kindness of a friend at Montgomery, Ala., a shad taken from the Alabama River was sent to Prof. Holbrook, of Charleston, S. C., and he wrote me that he "felt certain" that the fish received and examined by him was identical with the White Shad of our Atlantic rivers. I have a letter from Chas. T. Pollard, Esq., of Montgomery, Ala., of 6th inst., in which, speaking of the White Shad in the Alabama River, he says: "They have gradually increased in quantity since they first appeared, and have year by year increased in size, until, to use the words of a native of South Carolina, who lived many years near Sistera Ferry, on the Savannah River,—they are now equal to the best Savannah River Shad."

The White Shad have chiefly been taken in the fish-traps at the foot of the Falls at Wetumpka and near Tuscaloosa. One, I am informed, has been taken from a trap at the head of the Coosa River, near Rome, in this State, and only some sixty miles below the locality in which the eggs were deposited by Major Cooper, in a tributary of the Etowah River. I also learn that some few have been taken with a dip net, near Selma.

I think that we may safely conclude that the White Shad may be as successfully established in the Mississippi River as it has been in the Alabama. Since

feeding-grounds for that delicious fish exist at the mouth of one river flowing into the Gulf of Mexico, may they not exist at the mouths of other or all the rivers discharging into that sea? Time must answer that question.

When the presence of the White Shad in the Alabama River became known, some enterprising citizens of Montgomery came to Savannah and procured a number of the young shad from the river, placed them in a hogshead of water, which was kept cool by occasional supplies of ice, and took them by railroad to Montgomery and placed them in the Alabama River. The purpose of this measure was to multiply more rapidly the shad already established in that river. My agency in placing the White Shad there was not then, I believe, known to those gentlemen, one of whom was Colonel Pickett, the Historian of Alabama.

(*Savannah, April* 19, 1866.)

June 5th.

Mr. CASSIN, Vice-President, in the Chair.

Twenty-two members present.

The following paper was offered for publication: "Description of new species of Diurnal Lepidoptera." By Tryon Reakirt.

Dr. Leidy observed that the small collection of fossils presented this evening by Dr. A. C. Hamlin is of interest, from the fact of one of them being a bird bone. Two accompanying shells are Balanus Hameri and Saxicava rugosa, post-tertiary species. The specimens were obtained from a railroad cutting on the banks of the Penobscot River, Bangor, Maine, 47 feet below the surface. The bird bone is a right humerus, resembling in its construction that of a Curlew.

Except the so-called bird tracks of the triassic sandstones, almost no fossil remains of birds have been found in the United States. The Museum of the Academy contains a few specimens, which have not been identified, as follows:

A left humerus, almost identical with the one above mentioned, both in form and size, from Tarboro', Edgecombe Co., N. C., presented by Dr. Booth.

The lower extremity of a left humerus and a right radius, from a miocene formation of Maryland, presented by T. A. Conrad. The specimens resemble in construction the corresponding parts in a Snipe, but are as large as in the Curlew.

The lower end of a left tibia, from Burlington Co., N. J., described by Dr. Harlan as the remains of a Snipe, Scolopax (Med. and Phys. Res. p. 280.)

The lower end of a left tibia, from the Niobrara River, of Nebraska, discovered by Dr. Hayden, in association with a multitude of mammalian remains. It resembles the corresponding part in a Crane. It is the only ornithic fossil among all the vertebrate remains from Nebraska, amounting to several tons in weight, which Dr. L. had detected.

June 12th.

The President, DR. HAYS, in the Chair.

Twenty-two members present.

June 19th.

The President, DR. HAYS, in the Chair.

Twenty-six members present.

The deaths were announced of Hon. Lewis Cass, Correspondent, and Prof. Henry D. Rogers, member of the Academy.

June 26th.

The President, DR. HAYS, in the Chair.

Twenty members present.

The following gentlemen were elected Members of the Academy: Dr. Henry B. Butcher, Dr. Geo. Guier, Mr. Henry C. Carpenter, Mr. S. Raymond Roberts and Mr. Jason L. Fenimore.

The following were elected Correspondents: George A. Otis, M. D. Mr. William H. French, and M. de Caligny of France.

On favorable report of the Committee, the following was ordered to be published:

Descriptions of some new species of Diurnal LEPIDOPTERA.

BY TRYON REAKIRT.

1. PIERIS YREKA, NOV. SP.

Size and form of *Pieris rapæ* L.

Male, upper side white, base sprinkled with black atoms, extending along the costa of the primaries as far as the end of the cell; a narrow black terminal line at the apex, and below this a few scattered black specks; a rounded black spot on the medio-superior interspace, midway between the cell and the margin. Secondaries with a small black spot on the costa, at two-thirds its length from the base; fringes white, expanse 1·88 inches. Underneath, the apex of the primaries is pale ochrey yellowish; an additional small black spot is in the medio-inferior interspace, otherwise as on the upper surface. Secondaries pale ochrey yellowish, thickly strewn with grayish or greenish-brown atoms, especially condensed towards the base; costa yellowish orange.

Body above black, with scattered whitish hairs; below white. Antennæ black, ringed with white; club tipped with white.

Female differs in having a large triangular apical patch, brownish-black, of which the lower portion is densest, upon the primaries, and in the enlargement of their central black spot, and also in that of the costal one upon the secondaries.

Below, the primaries as in the *male*, the hind wings much more yellowish.

Hab.—California. Coll. Tryon Reakirt.

2. PIERIS CASTORIA, NOV. SP.

Size and form of *Pieris oleracea*, Harris.

Male, upper side pure white, inner half of costa of primaries, and base of both wings, strewn with a few dark atoms; a rounded black spot in the medio-superior interspace of the fore wings, situate as in the preceding species; no other markings; fringes white, expanse 2—2·12 inches.

Underneath immaculate white; a faint yellowish tinge on the apex of the primaries, and along the costa of the secondaries.

Body black, with whitish hairs below; antennæ black, with incomplete white annulations interrupted above. Club yellowish, or yellowish brown at tip.

Hab.—California. Coll. Tryon Reakirt.

3. PIERIS OCCIDENTALIS, Reakirt.

Reakirt, Proc. Entom. Soc. Philada., 1866 (ined).

Hab.—California, Rocky Mountains. Coll. Tryon Reakirt.

I have an example of *Pieris Sisymbrii*, Boisd, from Northern California, of which the ground color is a very clear lemon yellow; it differs, however, in no other respects from types of the same.

4. CALLIDRYAS THAURUMA, NOV. SP.

Male, very similar on the upper side to *C. Hilaria;* the irregular outline of

the sulphureous basal portion remaining the same; there is, however, an oblong black discal spot upon the primaries, and the black terminal line of *Hilaria* is either entirely wanting, or represented only by a few faint atoms; the nervular extremities of the secondaries are marked by minute dark points.

Under side greenish white, crossed with innumerable waved darker lines upon the upper half of the primaries and their apex, and over the secondaries. Costa of primaries continuous reddish brown for a short distance from the base, followed by scattered points thence to the apex, and along the outer margin, all of the same color; also an indistinct line running in from the apex: a large rounded ferruginous discal ocellus, pupilled with violaceous-silvery; base suffused with yellow; an orange streak within the cell.

Secondaries darker than the primaries, lightened with pale greenish white above the subcostal and median veins; a small silvery spot, encircled with ferruginous, on the lower disco-cellular, and six minute rosy, or rose-brown spots, one in each interspace, midway between the cell and outer margin.

Fringe greenish white; expanse three inches.

Thorax black, covered with long greenish-yellow hairs; abdomen and lower portions greenish-white; antennæ rosy or ferruginous, darker on the club.

Female, base of both wings pale yellowish-white; the mesial portions become more yellowish, and the depth of color is gradually increased to yellowish-orange on the outer margins; a large rounded black discal spot on the primaries; a bright ferruginous border at the apex, and on the outer margin, extending below half its length, at first continuous, afterwards maculate; interior to this, a maculate series, similarly colored, bent nearly at a right angle, just below the apex, and terminating at the costa on the one side, and on the other just above the end of the marginal border.

Below, bright ochreous-yellow; the markings of the *male* remain constant, with the difference in color, with the reappearance of the interior bent band of the fore wings, and the addition of a rounded, ferruginous spot within the cell of the secondaries, obliquely above the discal ocellus; the six submarginal spots of the same wing are considerably enlarged.

Fringe yellowish orange; expanse 2·65 inches.

Body above, abdomen and antennæ as in the male; thorax below, bright ochre-yellow.

Hab.—Madagascar. Coll. Tryon Reakirt.

5. TERIAS JAMAPA, NOV. SP.

Female? Above pale sulphur yellow; fore wing costa strongly arched; apex rectangular; outer margin from the middle curved outwards, and deeply crenulated; a large apical black patch extending from the outer third of the costa, nearly to the inner angle; its anterior outline presents two short terminal, nearly straight lines, and three prominent curves, of which the upper is double the length of either the others, but shallow, while the lower two approximate to a semicircle in form, and are of considerable depth.

Hind wing with the outer margin between first and second median veinlets produced into a longish pointed lobe, nearest the second branch, and partially entered by it; the ends of the nervules marked by minute dark points, otherwise the secondaries are immaculate.

Underneath, the apex of the primaries and the secondaries are suffused with ochreous, and reticulated with fine ferruginous lines; white atoms are sprinkled over the surface, and in some places, form condensed spots; three of these are situated below the cell and first veinlet, another at the upper end of the first disco-cellular, and several on the costæ of both wings; a small black discal spot on the primaries, and a number of minute black points on the lower outer margin of the secondaries.

Expanse 1·55 inches.

Hab.—Mexico (near Vera Cruz). Coll. Wm. H. Edwards.

Mr. Wm. H. Edwards, of Newburgh, N. Y., has kindly placed in my hands,

for examination, a series of Mexican Rhopalocera, descriptions of a number of which will be found scattered throughout this memoir.

6. TERIAS SOLANA, NOV. SP.

Male. Upper surface : primaries yellow, becoming whitish on the inner margin; costa thickly strewn with greenish-black atoms; a large black apical patch running from the middle of the costa to the first median vein, along which it is continued to the outer margin; the interior outline of this patch is somewhat crenulate.

Secondaries white, yellowish only at the apex, on which there are two large black conical spots; short black lines run up the upper nervules from the outer margin.

Below the base and central portion of the primaries are yellow, becoming whitish on the inner margin; the apex of the same and the secondaries are ochreous, strewn with multitudes of dusky atoms, of which there are three principal condensed rows on the latter; all short, and none extending entirely across the wing; there are two small discal spots upon each wing, the upper upon the hind wings forming the terminus of the first atomic line.

Fringe yellowish, becoming pale ferruginous at the apex of the primaries, and towards the anal angle of the secondaries; expanse 1·5 inches.

Thorax above black, with whitish hairs, and three short dark stripes; abdomen whitish, with a narrow dark dorsal line. Thorax underneath ochreous, abdomen pure white; antennæ black, with white annulations.

Hab.—Mexico (near Vera Cruz). Coll. Wm. H. Edwards.

7. EUPLŒA PAPUANA, NOV. SP.

Male.—Upper surface dark velvety brownish-black, paler on the outer margin of the fore, and upon the hind wings; two long, rather narrow dull brown vittæ in the medio-posterior interspace; a submarginal row of seven chalk-white spots, fringed with bluish; of these the first two are respectively above and below the fifth subcostal veinlet, both being larger than any of the following,—the second mostly so,—and in each of the ensuing interspaces there is one, the fourth being the least, and the seventh tripartite, composed of two small lunes and a dot; there are three minute dots nearer the margin, obliquely below the fourth, fifth and sixth spots respectfully.

Secondaries with a submarginal row of ten spots, of which seven are oval; the main axis of the first three is placed transversely to that of the others; the eighth and ninth are rounded, and the tenth a narrow streak; following these is a marginal series of small dots, obsolescent towards the outer angle.

Under surface, the submarginal row of above is reproduced, having added a small spot nearer the costa. There is also a marginal series of eleven small rounded spots; a small bluish spot above the upper radial, near the cell, another within the cell, and a third, considerably larger, in the medio-superior interspace; a small oblong patch of appressed hairs in the medio-central interspace.

Secondaries have two white spots at the base of the wings; the submarginal series of above, and a marginal row of twelve, the last coalescing with the terminal one of the preceding row; a minute spot in the medio-superior interspace.

Color of under side shiny brown, darkened at the base of the primaries.

Fringe brown and white alternately; expanse 3·5 inches.

Hab.—New Guinea. Coll. Tryon Reakirt.

I am not quite sure of the specific distinctness of this beautiful Danaid; many of the published descriptions of the members of this genus are extremely imperfect, and the insects themselves so subject to variation that it is very difficult to determine them correctly, without comparison with the original specimens.

AMAURIS, Hübn.

Amauris. p. , Hübner.
Danais, (Sect. I.) E. Doubleday.

"The males have a patch of peculiarly formed, and closely placed scales, situated on the sub-median nervule of the posterior wings, not far from the outer angle.

"The males of the first group have the anterior tibiæ and tarsi covered with closely appressed scales."—*E. Doubleday.*

There exists no sufficient reason why Hübner's genus should not be recognized as valid, and the few species composing it be separated from the great mass of the Danaïdes.

Geographically, structurally, and in coloration, they differ as much from their former congeners, as is possible within the range of a closely connected family; and it seems to me, that only from a total misapprehension of the rules of genetic formation, could such a naturally well defined group have been merged into another of opposed forms.

The four species of which it has been hitherto composed are all essentially African, as will be seen from the following summary:

1. *Amauris phædon*, Fab. Mauritius.
2. " *echeria*, Stoll. S Africa.
3. " *egialea*, Cram. W. Africa.
4. " *niavius*, Linné. W. Africa.

To these well known species I now add a fifth, to which Dr. Boisduval has given the MS. name of *Danais ochlea;* its description follows.

8. AMAURIS OCHLEA, Boisd. sp.

Danais ochlea, Boisd. MSS.

Male.—Upper surface: primaries rich velvety black; a transverse sub-apical white band, cut in three parts by black veinlets; another much larger transverse band occupies the lower central portion of the wing, extending from the subcostal to the submedian vein, and is divided by the black median nervule and first branch into three large white patches; a small rounded spot near the apex; two others on the costa, between the transverse band, above the upper of which there is also a minute narrow dash, and three more near the outer margin, placed between the lower portion of the first band and the inner angle: of these the first is the largest; between the first two of these spots and the margin there are three very minute dots. All of these markings white, or pale glaucous white.

Secondaries dark brownish-black; a large semi-transparent white space occupies the basal and mesial areas, extending from the costal nervure to the abdominal margin, divided into ten spots by the black veins and veinlets; three submarginal white spots on the upper half of the outer margin.

Fringe black, alternated with white on the hind wings; the primaries are cut with white only near the middle of the outer margin; expanse three inches.

Underneath chiefly as above; the apex of the primaries and the terminal border of the secondaries become brownish. Upon the first there is an additional small apical spot, and in place of three marginal spots there is a row of seven, the two lower coalescing with the third submarginal spot. The secondaries have a white spot at their base, and two submarginal rows, composed respectively of eleven and thirteen white spots.

Hab.—Zambesi. Coll. Tryon Reakirt.

9, MECHANITIS UTEMAIA, nov. sp.

Female. Upper surface: primaries, basal two-thirds orange tawny, occupying all the area within a line drawn from upper third of the costa to the middle of the outer margin. In addition to the usual costal stripe, a narrow terminal line along the lower part of the outer margin, and a streak along the submedian vein, but not touching the inner margin, there are four other spots, all black, placed thus: one, trapeziform, within the cell, and one, rounded and smaller, between the first and second median branches; a broad bar across the end of the cell, and a narrow, curved, widening at the tip line runs up the

medio-central interspace, from the outer margin; a bent opaque yellow belt, fringed with orange tawny, marks the extremity of the latter area, and another, abbreviated, rises from the costa between the discal bar and spot. The apical portion of the wing is black, traversed by a broad opaque yellow bar, also shading into orange tawny.

Secondaries with a transverse maculate stripe, and a border, terminal, black; on this last some indistinct white spots; remainder of wing orange tawny.

Under surface of both wings chiefly the same, with the addition of seventeen white marginal spots; the abbreviated yellow bar of the primaries extends here from the costa to the median vein; on the secondaries there is a black costal stripe, in addition to the markings of the upper surface, the space between which and the discal one is tinged with yellowish; the base is also marked with a yellow spot; expanse 3·25 inches.

Thorax and abdomen above, blackish-brown, the first with a central yellow stripe; wing tippets orange tawny; below yellowish. Antennæ yellow, ringed with orange tawny, black towards base.

Hab.—Honduras. Coll. Tryon Reakirt.

Very similar to *M. lysidice* and *doryssa*, Doubldy., and Bates, and in common with both, is a local race of *M. polymnia*. Specimens of the first are in my collection, from the same locality, and for a fine example of the second, from Guatemala, I am indebted to Mr. H. W. Bates.

10. Melinæa paraiya, nov. sp.

Male. Upper surface; apical half of fore wings dark brownish-black, with a very irregular interior outline, closely resembling that of *M. Egina* as far as the first median veinlet, thence it is curved inwardly, and terminates in an attenuated line on the basal third of the hind margin; across this there are two equidistant, semi-opaque yellow bands, of which the apical is continuous, and the other is divided into three spots, the central one being much the least; there is also a sub-marginal row of small white spots, varying from six to ten in number; the basal third of the surface, excepting the costa, throughout its entire length, which is black, is rich orange tawny, and the space between this and the outer black portion is occupied by a broad semi-opaque yellow belt; within the cell there are two large rounded black spots, which mark the chromatic line of separation.

Secondaries orange tawny, with a broad black outer margin, on which appear some indistinct spots, and a discal series of six oblong black spots, unconnected with the terminal border, and of which the second is very large, whence they gradually diminish to the abdominal margin.

Underneath the primaries remain chiefly as above. The secondaries have the base marked with yellow; a short black bar runs along the costal veins from the base, and there are one or two additional spots on the apical end of the discal row; the black outer margin also contains eleven or twelve small white spots. Expanse 3—3·75 inches.

Antennæ black, becoming tawny ash-colored on their outer third. Thorax black, with a yellow dorsal stripe; wing-covers and collar orange tawny, dusky yellow beneath; abdomen brown above, marked with orange tawny on the upper part of the first two segments, a broad yellow ventral stripe, and two narrow lateral yellow lines, reaching only to the end of the second ring.

Hab.—Rio Janeiro; St. Catherine's Island, Brazil. Coll. Tryon Reakirt.

Taken in company with *Hel. Eucrate*, *Mech. Lysimnia*, *Napeog. Sulphurina*, and *Ith. Euritea*.

It is a local race of *Mel Egina*, but mimics neither the Heliconoid nor Danaid form with which it is associated.

11. Heliconius Wallacei, Bates, in litt.

Hel. clytia, var. Bates, Trans. Linn. Soc., p. 556, n. 6 (1862).

"The first yellow belt of the fore wing is narrow, and similar in shape to the first white belt of *H. Antiocha*."

Hab.—Amazons. Coll. Tryon Reakirt.

12. Eucides zorcaon, nov. sp.

Male. Upper surface: fore wings black; four transverse bands, of which the apical is composed of four oblong spots; the second crosses the cell near its extremity, and consists of two dashes above the cell, an irregular narrow one within it, and a long, gradually tapered stripe below it. Both these bands are entirely dull ochraceous; the third rises from the base, follows the first median veinlet to its middle, up to which point it is orange tawny, is then suddenly turned above this nervule, and runs nearly to the outer margin; this latter portion is ochraceous, and is much compressed near its lower extremity; the fourth is orange tawny, and occupies the length of the inner margin below the submedian vein.

The hind wings are black, with a broad central orange tawny belt, through the middle of which passes a black band, sometimes united with the outer border towards the apex, and usually narrowed towards the abdominal margin; there is a row of indistinct spots on the outer margin, especially prominent near the anal angle.

Under surface; disposition of fore wings' markings remains the same, but they are much reduced, with a consequent increase of the black and blackish-brown areas; the costa has a short basal stripe of orange tawny, and there are three or four small white apical spots.

Secondaries chiefly as on the upper side; there is an additional transverse stripe, ochraceous, running from the base nearly to the outer angle, and marked on its under side at its origin with a white point; two rows of well-defined white points on the outer margin, of which the interior, numbering fourteen, are the largest; the outer row contains fifteen. Expanse 3—3½ inches.

Hab.—Mexico (near Vera Cruz); Coll. W. H. Edwards. Honduras, Guatemala; Coll. Tryon Reakirt.

As may be seen from the foregoing description, this pretty species bears considerable resemblance to *Eucides Cleobœa*, Hübn. I find, however, from the examination of a large number of specimens of both, that their differences are always constant, and such as warrant the creation of a separate name for the designation of this form, which, although doubtless a local race of the *Cleobœa*, has become perfectly segregated from the older type; I have seen no intermediate varieties.

13. Acræa orizava, nov. sp.

Upper surface glossy bluish-black; primaries with a large transverse yellow spot, divided by the median vein and its branches into five parts.

Beneath pale ochreous, with the nerves, and streaks between them, black; a very large central yellow patch on the fore wings, crossed only by black veins; base of the fore wing black, that of the secondaries more yellowish. Expanse 2·25—2·50 inches. Body and antennæ black.

Hab.—Mexico. Coll. Tryon Reakirt.

Closely allied to the *A. leucomelas*, Bates, of Guatemala, of which it may be regarded as a more northern modification. It differs chiefly, but constantly, in size and number of the yellowish spots of the primaries.

14. Agraulis huascuma, nov. sp.

Upper surface bright orange-brown; markings of primaries as in *A. Juno*, but much narrower, more clearly defined, and always deep black. Secondaries with a broad terminal border, containing a series of orange-brown lunules.

Underneath, the markings present no perceptible difference from those of *Juno*, but the shades are darker, the silver spots more clearly defined, and the base of the fore wings much more reddish than in that species. Expanse 2·50 to 2·75 inches.

The outer margin of the primaries is not so deeply sinuate, nor are the indentations of the secondaries so prominent as in *Juno*.

Hab.—Mexico. Coll. Tryon Reakirt.

A local race of *Juno*, differing but slightly from the Equadorean form *Andicola;* these are constant, however, in regard to the coloration and shape of the wings; in the latter respect, it approaches more nearly to *Lucina*, Felder.

15. EUTERPE ARECHIZA, NOV. SP.

Male. Fore wings narrower and more sinuate than in *Bithys;* the hind wings dentate. Upper surface brownish-black, traversed by two maculate, white bands; the first extends from the outer third of the costa of the fore wings, to the middle of the abdominal margin of the hind wings, consisting on the first of eight widely separated spots, on the last the band is broken only by the dark veins; the second band is formed of small rounded white spots, running obliquely from the costa of the primaries to their inner angle, and sub-marginally all equidistant from the border, on the disc of the secondaries; there are also some minute white terminal streaks at the apex of the fore wings, and some marginal ones in the middle of the hind wings' interspaces.

Underneath pale brown, with darker shades between the veins of the hind wings; the terminal streaks on the outer margin of the primaries are yellowish. The inner band of the secondaries is striped narrowly with yellow lines, beside which there are some small spots and dashes near the base, and the submarginal and marginal rows, all yellow; there are also two red basal patches. Expanse 1·75—2 inches.

Body and antennæ as in *Bithys.*

Hab.—Mexico. Coll. Tryon Reakirt.

A local race of *Eut. Bithys.* In addition to the differences in ornamentation and the shape of the wings, I have found that in *Arechiza* the disco-cellulars of the fore wings form but a very slight angle with each other, and the second subcostal veinlet of the secondaries is invariably thrown off much nearer the base than in *Bithys;* the difference in distance being fully equal to one-half the distance between the first and second subcostal veinlets of the latter species.

16. LYCÆNA CATALINA, NOV. SP.

Male. Upper surface brown, glossed with violet blue, except a broad terminal border on both wings. Fringes white, cut with brown.

Under surface ash-brown, darkest at the base of the secondaries, more diluted on the outer margin of the primaries.

The fore wings have two spots within the cell, one at its extremity, the other nearer to the base; a submesial sinuated row of six rounded and oblong spots; and a submarginal row of six lunes; all brown, or blackish-brown encircled with white; the outer row is usually incomplete, and sometimes almost obsolete.

The secondaries have the main portion of the cell occupied by a large whitish spot, running up to the base, and having a rounded black spot in its centre. Between this and the outer margin there is a broad and similarly colored belt, formed of confluent sagittæ, each of which is preceded by a rounded black dot, encircled with white, and followed by a narrow black crescent. Below the third of these from the inner margin, there sometimes appears an ochreous lune, upon which is impinged posteriorly a brown bar, tapering gradually to the hind margin. There is another white-ringed black spot on the costa, above the similar one within the cell. Expanse 1·13—1·20 inches.

Body blackish-brown above, with some blue hairs on the thorax, underneath cinereous. Antennæ black, ringed with white; club tipped with the same.

Female, appears to differ only in the greater size; expanse 1·25—1·30 inches.

Hab.—California. (Coll. Tryon Reakirt.)

17. LYCÆNA MONICA, NOV. SP.

Male. Upper surface rosy violet, covered with an ashy hue, darker towards

the base; a narrow terminal black line runs along the outer margin of both wings; near the anal angle of the hind wings, this is preceded by a narrow white line, above which there are two rounded black spots, the interior being the largest. Hind wings with a single tail, black, tipped with white. Fringe brownish; expanse 1·05—1·12 inches.

Underneath whitish ash colored; a long discoidal streak, and three transverse rows of dark ash-colored dashes, of which the two outer are close together, running parallel with each other, and also with the outer margin, to which they are very near; the inner one is midway between the margin and the discal bar; it is slightly sinuated; each of these rows is composed of six oblong dashes, all being surrounded by whitish lines from the ground color.

On the secondaries there are also three transverse maculated bands, containing the same number of spots, but differing in shape; those of the inner row only are oblong, those of the central being lunulate, and of the outer rounded; the two interior spots of the marginal row are jet black, glossed with some greenish metallic atoms, and are surmounted by two large orange yellow lunes; a discoidal bar as on the primaries, and three rounded black spots encircled with whitish, situated transversely near the base, one on the costa, another within the cell, and the third on the inner margin; a similar spot, sometimes only ash-colored, on the middle of the costa; a narrow terminal line along the outer margin of both wings; tail as above; fringe brownish-griseous.

Body above black, with some reddish-violet hairs, underneath whitish; antennæ brown with white annulations, club reddish-ochreous.

The *female* is larger,—expanse 1·20 inches, and has the two black spots on the upper side of the secondaries, surmounted by orange lunules, sometimes indistinct.

Hab.—California. (Coll. Tryon Reakirt.)

Belongs to the group of which *Comyntas* is the type; it is more nearly related to the following new form, than to either that species, or its Californian prototype—*Amyntula*.

18. LYCÆNA TEJUA, nov. sp.

Male. Upper surface very similar to that of *Monica*, but with more of a bluish tinge; a narrow terminal line as in that species, but edged anteriorly with white, over the whole length of the secondaries, upon which there is only one black spot; tail double the length of that in *Monica;* fringe whitish, on the secondaries cut with black at the ends of the veins.

Underneath there are three transverse bands on each wing as in *Monica*, but arranged differently; the spots of the two exterior on the primaries are almost confluent, and the inner one is broken into two divisions—the spots in each running together; the upper consisting of four, and the lower, which is nearer to the base, of two; a discoidal bar, and a small spot on the costa between this and the inner transverse band.

On the secondaries the two outer rows remain the same, having, however, but one large black spot, surmounted by a very large pale orange-yellow lunule; rarely there are traces of another yellow spot interior to this; the inner band is formed very irregularly, and presents very much the appearance of a W; discoidal bars, and basal spots as in *Monica*.

Hab.—California. (Coll. Tryon Reakirt.)

19. LYCÆNA MARICOPA, nov. sp.

Male. Upper side brown, glossed with violet blue; a narrow terminal dark line along the outer margins; a black discal bar on the primaries, sometimes wanting, and some obsolete rounded spots on the hind margin of the secondaries. Fringe ash-colored.

Underneath ash-brown, darkest towards the base. Primaries: a large black discal bar; a subcentral, transverse, sinuated row of seven large rounded black spots all narrowly ringed with white; following these, and parallel with the

margin, another series of seven indistinct spots. Secondaries: a discal bar and two spots, one within the cell, the other above it; three transverse maculate bands; the first composed of eight large rounded black spots, and bent twice at right angles, the second of smaller, and sagittiform, and in common with the third, which is almost marginal, and very indistinct, runs parallel with the border; all these markings are encircled with white, and the seventh spot of the first and second rows are sometimes confluent. Expanse 1·25—1·35 inches.

Body black above, with some bluish hairs; beneath grayish; antennæ black with white annulations, lower part of club whitish.

Hab.—California. (Coll. Tryon Reakirt.)

20. LYCÆNA TEHAMA, nov. sp.

Male. Upper surface, brownish diluted with white, glossed with shining greenish blue, especially on the basal portions, and traversed by darker lined veins.

A black discal bar on the primaries; secondaries have a marginal series of rounded brown spots. Fringe white; brownish at the tip of the fore wings, and cut with black at the ends of hind wings' veins.

Underneath: primaries pale brownish griseous; a discal arc, a small double spot within the cell at one-third the distance from the arc to the base, a sinuate transverse median row, and an indistinct marginal row of spots, followed by a series of plainer lunules, all edged with white.

Basal half of secondaries dark brownish-gray, with a blue tinge at the base; within this are three small black spots, all largely encircled with white, and placed transversely to the base, and a large white patch at the end of the cell.

Posterior portion clear grayish white, edged terminally with a narrow line, and contains three transverse rows of dark spots; of these the interior are rounded and much curved; the central are lunulated, and the marginal rounded; the third from the anal margin of the two outer rows respectively are much enlarged, and sometimes embrace an intermediate, yellowish-brown lunule. Expanse 1·05—1·13 inches.

Body clothed with grayish blue hairs above, ash-colored below; antennæ black, annulated with white; club black above, ferruginous below.

Hab.—California. (Coll. Tryon Reakirt.)

Var. *a*, *male*; the secondaries present a submarginal row of connected brown lunules above the marginal spots; and the lustrous tinge is restricted to the basal area; expanse 1·20 inches.

Hab.—Los Angeles, Cal. (Coll. Tryon Reakirt.)

This is the Pacific representative of *L. Rustica* Edwards, of the Rocky Mountains; the two are very closely related.*

21. BRENTHIS MORRISII, nov. sp.

Upper surface uniform orange-brown; hind margin of both wings edged by a fine black line, always dilated at the ends of the veins, and which is preceded by a submarginal row of very angular black lunes; in the *female* the spaces enclosed between the two lines is pale tawny; primaries have a nearly straight black discal bar, and within the cell are three transverse spots, of which the central is the shortest; below the cell a broad black stripe runs from the origin of the first median veinlet, downward half the width of the interspace, and is then bent abruptly to the base, in the shades of which it becomes merged and lost. Beyond the cell, there is a mesial zigzag band, and a transverse row of rounded black spots, usually confluent with the marginal lunes on the apex; a short black bar rises from the costa behind these.

* There will shortly be published by the Entomological Society, in a series of notes to my memoir, upon "Colorndian Butterflies," descriptions of the following new Californian species:—
1. *Cœnonympha Pamphiloides*, Reakirt.
2. *Lycæna Cajona*, Reakirt.
3. *Polyommatus Mariposa*, Reakirt.

On the secondaries, in addition to the transverse row of large rounded black spots above the marginal lunes, there are four connected oblique black dashes below the cell; a black mark very much like a K within and above it, and a central rounded black spot within it; basal portions of both wings obscured by darker shades; fringe pale yellowish cut with black; expanse ♂ 1·70—1·75 inches—♀ 1·87 inches.

Under surface: primaries pale tawny, tinged with brownish red at the base, especially in the *female;* apical portion pale ochreous, or even yellowish crossed obliquely by a brick-red shade; the markings of above repeated, but faintly colored, and in the *male* the discal arc and central spot within the cell, each contain a narrow tawny line.

Secondaries with a broad central band of nine large connected spots, of which the first, fourth and seventh are the largest, all edged on either side with narrow black lines, and all with the exception of the fourth, which is silvered, pale buff-yellow. The space anterior to this is brick-red, with three pale yellow and one silvered spot near the base, and a yellow dot pupilled with black in the middle of the cell. The posterior half of the wing is pale buff; a series of seven marginal silvery patches, surmounted by elongated brownish sagittæ, shading into brick-red towards the outer angle; above these, a transverse row of rounded brick-red and brownish spots, the middle ones usually ocellated, and there are two flexuous brick-red lines between these and the central band; a narrow black terminal line, edges the outer margin of the wings.

Body black, covered with brownish red hairs, underneath tawny.

Hab.—California. (Coll. Tryon Reakirt.)

It affords me much pleasure to dedicate this beautiful species to my esteemed friend, Mr. Henry B. Morris, of Burlington, N. J.

Dr. Behr seems to have seen neither this nor the following form when he prepared his very valuable list of the "Argynnides of California."

2. BRENTHIS NENOQUIS, nov. sp.

Male. Fore wings slightly, hind wings much dentated. Upper surface tawny; a terminal line; a series of confluent marginal lunules also connected with the bordering line; a transverse row of large rounded black spots; a zigzag mesial band of large irregular spots and dashes, and the usual markings within the cell and towards the base of all the wings; all these, and very considerable basal area, deep black; fringe yellow, cut with black.

Underneath the primaries are tawny, becoming pale buff-yellow on the apical area, across which there is a violet brown shade and on the outer margin; the markings of above repeated but much diminished in size, and lightened in color.

Hind wings buff-yellow, mostly saturated with a rich violet-brown shade; a large silver spot at the base, cut by the costal vein; two rounded yellow, or silvery-yellow spots in the upper part of the cell, edged with a narrow black line; below these, two oblong velvety brown bars, one in the cell, and the other in the first median area, two small rounded silvery spots on the abdominal margin near the base, each ringed narrowly with black; an incomplete transverse maculate band of seven connected spots, of which the first, fourth and seventh, are much the largest, and are always silvered, the others, very rarely so; those mentioned are always bordered anteriorly with a narrow black line; and all of them posteriorly with dark violet brown; a submarginal row of six rounded dark brown spots, the third and fourth always pupilled with ochreous, the others rarely so; seven marginal lunules, of which the six superior are silvery, that on the anal angle bright yellow; a narrow terminal line edges all the wings; expanse 1·5 inches.

Hab.—California. (Coll. Tryon Reakirt.)

Closely related to no species hitherto described; probably is nearest to *fonticola*, Behr, but is very much less in size, besides possessing a radically different ornamentation.

23. EMESIS TOLTEC, nov. sp.

Upper surface dull reddish-ochreous brown; a broad transverse paler band occupies the middle of both wings, the space between it and the base traversed by numerous transverse waved lines, made up of many connected dashes and lunules; beyond the broad central belt there is a confluent row of darker lunules, widest on the costa, and gradually tapering to the abdominal margin; after these there is a submarginal row of rounded dark-brown spots, of the same range as the preceding; fringe brown; expanse 1·5 inches.

Primaries have the apex produced, and outer margin sinuated; secondaries rounded.

Underneath ochreous-yellow, with the spots of above repeated in ferruginous, a large patch of that color at the apex of the primaries, and another across their middle; a faint ferruginous tinge at apex of secondaries.

Hab.—Mexico. (Coll. Wm. H. Edwards.)

Very distinct from any of our described species.

24. SYNCHLOE QUEHTALA, nov. sp.

Upper surface black; an abbreviated band of four ovoidal white spots runs from the costa across the end of the cell of the primaries; a transverse curved row of seven minute white spots beyond the short band, and a larger white spot near the middle of the outer margin; secondaries with a small red spot near the anal angle, sometimes indistinct; fringe black cut with white; expanse 1·38 inches.

Under surface brownish black; primaries spotted as above, but with the markings enlarged and with two additional white spots on the outer margin; costa red at the base. Secondaries with a broad yellow mesial belt, extending from the costa nearly to the first median veinlet; a submesial transverse row of minute white spots, a large red spot at the anal angle, and three white lunes on the outer margin, of which two are close together at the apex, and the third on its lower half.

Body and antennæ black; legs reddish.

Hab.—Mexico. (Coll. W. H. Edwards.)

This is the least species of the interesting genus *Synchloe;* it approximates most nearly to *Hippodrome*, although still very distinct, and less than half its size.

25. PAPILIO ERIDAMAS, nov. sp.

Male. Upper surface black, faintly glossed with bluish-green; a long streak followed by an oval spot, both yellow, or yellowish-green, below the upper third of the costa of the primaries; a submarginal row of similarly colored spots near the outer border, becoming obsolete towards the apex; primaries sinuate; secondaries dentate, with a short elongated tooth, emarginations of both yellowish.

Secondaries with a submarginal row of seven large crimson spots, widely distant from each other, of which the first three are oval; the fourth semi-ovoid and larger; the fifth, and largest of all, is almost rectangular, with an indentation upon the lower extremity; the sixth intermediate in size between the fourth and fifth; the seventh is nearly square, about the size of the third, and with indentations on both sides; these are immediately followed by, and connected with yellowish spots, largely so after the first and gradually reducing to obsolescence under the last; expanse 3·5 inches.

Under surface lustrous brown, paler at the tips of the primaries, upon which, also, the subcostal ovoid of the upper side is indistinctly reproduced.

Secondaries with three crimson spots at the base, and a submarginal row of small, brilliant spots of the same color, the three nearest the anal angle being chevron-shaped, and the other four semi-lunate.

Body black; four spots upon each side of the thorax below, one at the insertion of the abdomen, and a continuous series on its lower part, not, however, extending upon the anal valves, all crimson.

[June,

Hab.—Mexico. (Coll. Entom. Society.)

A very beautiful species, closely allied to the *Xenarchus* of Hewitson, but from which its differences, as indicated in the diagnosis, are invariably persistent.

July 3d.

The President, DR. HAYS, in the Chair.

Twenty-nine members present.

The Chairman made some remarks on Trichina spiralis, and exhibited a portion of human flesh infected with the parasite taken from one of five persons who recently died of Trichiniasis in Iowa.

July 10th.

MR. CASSIN, Vice-President, in the Chair.

Thirteen members present.

July 17th.

The President, DR. HAYS, in the Chair.

Nine members present.

July 24th.

MR. VAUX, Vice-President, in the Chair.

Fifteen members present.

Prof. Cope remarked that he had made a few observations on some of the extinct vertebrates of the Mesozoic Red Sandstone, during an examination of the specimens preserved in the collection of Charles M. Wheatley, A. M., at Phœnixville, Pa.

Rhytidodon c a r o l i n e n s i s (Emmons, usually misspelled *Rutiodon*) appears to be, so far as extant remains are conclusive, a species of Belodon, Von Meyer, allied to B. p l i e n i n g e r i. One confirmation, the identity of dentition of the Würtembergian and Pennsylvanian species, had been pointed out to him by C. M. Wheatley. The posterior teeth are lenticular in section, nearly broad as high, crenate on both edges; the anterior cylindrical, slender and coarsely fluted; the first represent *Eurydorus serridens*, Leidy, Pr. A. N. S., Phila., 1859, 110, and the latter Rhytidodon Emmons.*

Clepsisaurus p e n n s y l v a n i c u s Lea, whose affinities have never been indicated, apparently belongs to the same great type as the preceding: while its teeth are without pulp-cavity, as pointed out by Leidy, those of the fangs of Belodon are very small.

He was also enabled to announce the discovery of the first undoubted Labyrinthodon of these beds. The species, which is of considerable size, is represented by portions of two crania and numerous teeth. It is apparently nearest Mastodonsaurus (Labyrinthodon) d i a g n o s t i c u s Von Meyer, in the proportions of the cranial segments and sculpture.

The largest fragment is eight inches long and eight and one-half wide, and is

* Prof. Owen (Palæontology) states that Cladyodon *Ow.* was applied to the same genus as, and is older than the name Belodon.

a portion of the table of the cranium exhibiting the usual medial depression, and embracing portions of the postorbital and parietal bones; one of the former is four in. six l. long; both are pitted medially (about 3½ pits in an inch) and marked with short coarse sulci posteriorly. The parietals are 2 in. 9 l. wide behind, and four inches wide between the anterior parts of the postorbitals. On what is probably the posterior part of the interorbital region (a small part of the posterior margin of the left orbit is preserved) commence two smooth shallow sulci 1 in. 2 l. apart, which are probably the posterior extremities of the superficial channels of the face of the Labyrinthodonts. Between them the surface is pitted, (4 or 5 to the inch.) The parietal bones are throughout longitudinally sulcate, (four and one-half to the inch), with obtuse ridges between. The parietal fontanelle was not discoverable, nor could the form of the orbits be certainly determined, though they were probably not large.

The teeth are of various sizes, sometimes two inches long, and more slender in proportion to the length than those of the Mastodonsaurus jaegeri and salamandroides; they are cylindrical, gently curved and acuminate, without external sulci; of the minuter sculpture nothing could be said, as Prof. C. had only examined the casts of the surface. In a few weathered sections the involuted folds of the enamel are well displayed. They are not convolute as in typical Labyrinthodonts, but perfectly straight and convergent to a minute central vacuity. In a tooth four lines in diameter there appear to be five principal radii which attain the centre, about twenty which nearly approach it, and thirty two shorter, none of which measure less than a half radius. These radii, though exceedingly delicate, may sometimes be seen in longitudinally fractured specimens. The roots exhibit a short conic pulp cavity.

Having observed traces of similar radii in a small fluted tooth having an oval section, much resembling some of those of Belodon (*Rhytidodon*), but perhaps Compsosaurus Leidy, it had occurred to the speaker whether these radii had any connection with the mineral constitution of the teeth. These were all of black dolomite, the weathered portions, between the radii, white. Radii and straight veins of other material were pointed out in some specimens in his collection by Wheatley, as iron and copper pyrites and silica, but these were either eccentric or irregular. Inquiry is therefore suggested respecting the existence of the labyrinthic structure in any of the above genera before described. The form and sculpture assigned to Centemodon Lea render comparison with the new species unnecessary.

The latter may be named MASTODONSAURUS DURUS. The cranial bones on which it is founded occurred in bed No. 15, a hard black shale, of Wheatley's section in Silliman's Journal Sci. Arts, 1861, 45, about 89 feet from the bottom of the series, while the tooth last described is from near 40 feet lower down, in Nos. 21 or 22. The Belodon comes from about 35 feet below the last.

Geologists have inclined to indentify these beds with the upper Trias or lower Jurassic. The identification of the Belodon and Mastodonsaurus points most strongly to the age being that of the Keuper or upper division of Trias.

July 31*st*.

DR. BRIDGES in the Chair.

Fourteen members present.

The following gentlemen were elected Members of the Academy: Prof. A. Stillé, Dr. Geo. H. Horn, Mr. J. G. Moore, Dr. A. Nebinger, Mr. C. G. Ogden, and Mr. Samuel L. Shober; and Mr. F. Cowan, of Washington, was elected a Correspondent.

On Report of the Committee the following was ordered to be published:

Contributions to the PALÆONTOLOGY of Illinois and other Western States.

BY F. B. MEEK & A. H. WORTHEN,

(Of the Illinois State Geological Survey.)

RADIATA.

ECHINODERMATA.

CRINOIDEA.

Belemnocrinus Whitii, M. & W.

Body below the summit of the subradials ovoid subcylindrical, and above this rather rapidly expanding; rounded below. Basal pieces very small, forming a flat subpentagonal disc, as seen from below; anchylosed so as to obliterate the sutures in the specimen examined. Subradial pieces unequal, three of them narrow, oblong or two and a-half to three times as long as wide, one scarcely more than twice as long as wide, and the other narrow below, but nearly two-thirds as wide above as the entire length. First radials (or at least the only one remaining in the typical specimen) quadrangular; nearly half as long as the subradials, and wider at the top than the smallest subradial, narrow below, and widening upwards; rather deeply sinuous above across its entire breadth, for the reception of the second radial. Cavity of the subcylindrical part of the body formed by the subradials, infundibuliform, the wide part above extending down about one fourth of the way. Anal piece resting upon the slightly concave upper extremity of the largest subradial piece between two of the first radials; its form unknown. Surface nearly smooth or merely granulose. A slightly impressed, distinctly defined, obovate flattened area, occupies the whole surface of the anal plate, a small portion of the upper margin of the subradial upon which it rests, and a larger part of the first radial on one or both sides of the anal piece. Column and arms unknown.

Length of body to the summit of first radial pieces, 0·57 inch; breadth of same at the top, about 0 35 inch; do. of same at the summit of subradials, 0·25 inch.

This species differs from *B. typus*, of White, the only other known species of the genus, in its proportionally shorter and more oval form below the summit of the first radial pieces, and the greater expansion above; also in the greater inequality in the size and form of the subradial pieces; and in the peculiar flattened or impressed area in the region of the anal piece. It likewise differs in having the depression in the upper side of the only remaining first radial, for the reception of the second radial, proportionally broader; while the visceral cavity occupies near one-fourth the length of that portion of the body formed by the subradials, instead of only about one-tenth.

The specific name is given in honor of Prof. C. A. White, the accomplished State Geologist of Iowa.

Locality and position.—Lower bed of Burlington limestone, of the Subcarboniferous series at Burlington, Iowa. Mr. Charles Wachsmuth's collection.

Subgenus NEMATOCRINUS. M. & W.

Synbathocrinus Wachsmuthi, M. & W.

General form, when the arms are folded together, elongate cylindrical; body below the arms small and basin-shaped, being truncate below for the reception of apparently a rather large column, thence spreading rapidly to the summit of the first radials, which are horizontally truncated on the same plane all around their entire breadth above. Arms simple, very slender, equal and elongated,—rising abruptly from the first radials, seven to each, or thirty-five in the entire series, and composed each of a single series of pieces, twice to three times as long as wide, and very like the joints of the tentacula of other crinoids. (Form and arrangement of the plates of the body unknown.)

Height of body, 0·12 inch; breadth about 0·30 inch; breadth of truncation of the base, 0·14 inch; length of arms, known to be at least 1·35 inch, but probable more; uniform breadth of do., 0·03.

We very strongly suspect that this little crinoid will be found to be the type of a new genus bearing somewhat similar relations to *Synbathocrinus* that *Pterotocrinus* bears to *Dichocrinus*. The fact, however, that we have been unable, after repeated trials, to make out the form and arrangement of the plates composing the body, has caused us to place it provisionally, for the present, as a subgenus under *Synbathocrinus*, with which it agrees exactly in form and general habit, as well as in having the base composed of three anchlyosed pieces. Even if it should, however, be found to possess precisely the structure of *Synbathocrinus* so far as regards the body below the arm-bases, we think its very peculiar character of having seven arms (instead of only a single one) rising directly from the summit of each broadly truncated, first radial piece, a sufficient difference to entitle it to rank as the type of a distinct subgenus, if not indeed of a distinct genus. The fact that all the species of *Synbathocrinus* have, so far as known, but a single arm rising from each ray, renders it improbable that there will be found intermediate gradations in this character when a greater number of species are known.

On one side of the specimen there is some appearance of a small cuneiform anal piece resting upon the first radials, between two of the arm bases, as in *Synbathocrinus*, though we are rather inclined to think this merely the base of one of the arms folded in between the others so as to be hidden, excepting at its base, by the closing together of the arms on each side. We have counted this as an arm, and consequently, if it should prove to be an anal piece, there would be but thirty-four arms, which would leave but six instead of seven arms in one of the rays—perhaps the anterior one.

We have named this curious species after Mr. Charles Wachsmuth, of Burlington, Iowa, its discoverer, and one of the most successful collectors at that interesting locality.

Locality and position.—Burlington, Iowa, from the upper part of the Burlington group, of the Subcarboniferous series.

CYATHOCRINUS FARLEYI, M. & W.

Body, below the summit of the first radial pieces, rather deep cup shaped or subglobose (oblique in the typical specimen), and composed of thick strong pieces; under side rounded. Base subdiscodial or depressed basin-shaped, with a pentagonal outline, composed of unequal pentagonal pieces, very narrow at their connection with the column, and widening rapidly to their lateral angles; all curved upwards at their superior outer extremities. Subradial plates three or four times as large as the basal pieces, about as wide as long, convex, and each provided with several irregular wart-like protuberances in the middle; four of them hexagonal, and one on the anal side heptagonal. First radial pieces a little larger than the subradials, wider than high, and each having a general pentagonal outline, but the superior lateral angles, which usually curve inwards somewhat between the second radials, are more or less truncated; facet for the reception of the second radials large, or occupying about three-fourths the breadth of the upper side of each piece, and on the outer side excavated downwards near half the length of the plate, with a distinct outward slope. First anal piece about the size of the largest basal pieces, quadrangular in general outline, but having two other inconspicuous angles above, in consequence of small facets for the reception of three small pieces in the next range, probably belonging to the vault; resting squarely upon the upper truncated side of the heptagonal subradial piece, and connecting on each side with the adjacent first radials, above the horizon of the summits of which it does not project. Surface smooth or finely granular, with the exception of the irregular pustulose protuberances on the middle of each subradial plate. (Arms and column unknown.)

Height to summit of first radial pieces, 0·68 inch; breadth, 0·80 inch.

This species will be readily distinguished from all others known to us, by the peculiar little wart-like protuberances on the middle of each subradial piece. These are not incipient radial costæ, nor properly nodes, but little irregular pustular prominences like drops of melted wax. Some of them are confluent, while others are distinct and irregularly grouped. They rarely extend to the margins of the plates, and are almost entirely confined to the subradials, though there are some faint indications of one or two on the lower half of one of the first radials.

This species is named in honor of Dr. R. D. Farley, of Jerseyville, Illinois, to whom the Illinois Geological Survey is indebted for some interesting specimens.

Locality and position.—Keokuk division of the Subcarboniferous series, near Warsaw, Ill.

ACTINOCRINUS CALYCULUS *var.* HARDINENSIS.

Although this little crinoid agrees so nearly with *Actinocrinus calyculus*, Hall, that we are in doubt in regard to the propriety of considering it a distinct species, the fact that it comes from the upper part of the St. Louis limestone, while the *A. calyculus* holds a position in the Spergen Hill beds, 200 feet below, taken in connection with the usually restricted range of the *Crinoidea*, and some slight differences of structure mentioned below, cause us to place it for the present, at least, as a distinct variety from the typical *A. calyculus*.

In size, form, arm formula, surface markings, and most of its characters, it agrees well with *A. calyculus*, from which it differs in the following details, viz.: Instead of having but one or two interradial pieces to each space, the first one much larger than the others, and ten or eleven sided, it has four or five of these pieces to each interradial area, the first of which is not greatly larger than the others and only six to eight sided. Again it differs in having six anal pieces instead of but four, while its vault pieces are merely tumid instead of "acutely spiniferous," excepting a few of those in the depressions between the arm bases, which support little short spines.

If *Batocrinus* should be separated from the genus *Actinocrinus*, this species should doubtless be placed in it, as it has the general habit of the species of that group, though its arm bases do not form a quite continuous series, the intermediate spaces between those belonging to each two adjacent rays being more deepling sinuous than those between each two of those belonging to the same ray.

Locality and position.—Hardin County, Illinois, from the upper part of the St. Louis division of the Subcarboniferous series,—the highest position in which the genus has yet been recognized in this country.

Genus STROTOCRINUS, M. & W.

Calathocrinus, Hall, (subgen. *Actinocr.*), 1861. Descript. Crinoidea, Prelim. Notice, p. 12; (not Von Meyer, 1848,—Leonhard and Bronn's Jahrb. p. 467.)

The name *Calathocrinus* was proposed by Prof. Hall in the paper above cited, for a group including those curious species of so-called *Actinocrinus*, with an obconic body and the summit more or less flattened and greatly spread out in the form of a ten-rayed star, such as *Actinocrinus perumbrosus*, *A. regalis*, Hall, &c. As the name *Calathocrinus* had, however, been previously used for another type by von Meyer, in 1848, it becomes necessary to find another name for our American group, and we have consequently proposed to call it *Strotocrinus*, in the Report of the Illinois Geological Survey (p. 188), now in press. It includes *Strotocrinus perumbrosus*, *S. regalis*, *S. glyptus*, *S. erodus* and *S. lyratus*, all of which had been described by Prof. Hall under *Actinocrinus*.

Genus STEGANOCRINUS, M. & W.

We have proposed the above name in the Illinois Report (p. 195) now in press, for a genus allied to *Actinocrinus*, with which it agrees in the structure of the body, but differs in having the rays from the second or third primary radial pieces

greatly extended out horizontally in the form of remarkably elongated, slender, rigid, arm-like appendages, which are covered in above, all the way out, with small pieces like these of the vault, and bear the true arms along their sides. In some species, these long free rays are known to bifurcate once, while in others they are simple all the way out, so that in the latter the radial pieces may be said to continue indefinitely in a direct line.

Type.—*Steganocrinus pentagonus*, = (*Actinocrinus pentagonus*, Hall.) It also includes *Steganocrinus araneolus*, = (*Actinocrinus araneolus*, M. & W.), and *S. sculptus*= *Actinocrinus sculptus*, Hall.

RHODOCRINUS NANUS, M. & W.

Body small, subglobose, with nearly vertical sides which round under below to the basal concavity. Base very small, and entirely concealed in the concavity of the under side, by the end of the column. Subradial pieces comparatively large, forming the under side of the body, and curved up so as to show nearly half the surface of each in a side view,—hexagonal in general outline, but probably each with a seventh nearly obsolete angle at the middle of the side connecting with the base. First radials nearly as large as the subradials, and regularly heptagonal in form; second radials rather more than half as large as the first, normally hexagonal, but sometimes pentagonal and rarely quadrangular; third radials larger than the second, generally wider than long, pentagonal, hexagonal or heptagonal, and supporting upon their superior sloping sides, apparently the first brachial pieces, which are not free, but supported by the first free pieces in the next range; if there were no farther divisions of the free rays, there must therefore have been two arms to each ray, or ten in the entire series. First interradials smaller than the first radials, and resting upon the truncated upper sides of the subradials, regularly hexagonal in form, or rarely with the superior angle slightly truncated by the middle piece of the next range, so as to form a seventh angle; second range consisting of two, or rarely three, rather smaller generally hexagonal pieces, above which there are five or six other still smaller pieces connecting with the vault between the arm bases, thus making some eight or nine interradials to each area; anal pieces about the same number as in each interradial space, but a little larger in size and differently arranged, there being three pieces in each of the ranges above the first one, the middle ones of which continue on up in a right line to connect with the base of the proboscis above. Vault depressed to the level of the upper side of the arm-bases, and provided with deep broad furrows or depressions radiating from near the middle to the interradial spaces, composed of small, irregular, rather tumid pieces. Opening in the summit of a short, rather narrow lateral proboscis, which rises vertically, with its outer side nearly on a line with the vertical side of the anal area.

All the body plates are convex in the middle, from which point rather obscure ridges radiate to each of their sides. The greater convexity and larger size of the radial pieces impart a somewhat pentagonal outline to the body, as seen from above or below. The surface is somewhat granular, and the column, which is composed near the base of alternately thicker and thinner pieces, is round and pierced by a minute rounded cavity.

Height of body, 0·33 inch; breadth of do., 0·35 inch.

This neat little species is evidently closely allied to *R. Barrisi*, of Hall, from which it differs in having its body plates merely convex and provided with radiating ridges, instead of being "ornamented by sharp, angular nodes and spines;" also in having eight or nine interradial pieces to each area, instead of only four to six. Another difference is to be observed in the size of the third radial pieces, which in *R. Barrisi* are "minute," while in our species they are as large as the second radials. We only know the *R. Barrisi* from the published description, but we have been assured by M. Wachsmuth, who compared the form under consideration with authentic examples of that species, that they are easily distinguished.

Locality and position.—Burlington, Iowa. Lower beds Burlington group of the Subcarboniferous series. Mr. Wachsmuth's collection.

Genus ONYCHOCRINUS, Lyon and Casseday, 1859.

Although for some time past inclined, like others, to regard the type for which the name *Onychocrinus* was proposed, as probably in no respect distinguishable from *Forbesiocrinus*, recent comparisons of some fine examples of these forms lead us to think that they may be even generically distinct. At any rate, they are certainly distinguishable upon more constant characters than those separating *Forbesiocrinus* from *Taxocrinus*, which groups we have elsewhere shown* blend together to such an extent that we do not think they can be separated more than subgenerically, upon any characters yet pointed out.

At present we are inclined to regard *Onychocrinus* as being generically distinct from *Forbesiocrinus* and *Taxocrinus*, but it may possibly form a second subgenus under *Taxocrinus*. In the nature of the column, the number and arrangement of the basal, subradial and primary radial pieces, *Onychocrinus* agrees exactly with *Forbesiocrinus*: while in other points of structure these types differ to an extent that could scarcely fail to attract the attention of the most careless observer, on comparing good specimens of each. In the first place, *Onychocrinus* differs from *Forbesiocrinus* in having the rays from their origin more divergent, or even in some instances extending out horizontally on the same plane with the base; while in these extreme cases the long rays, which are free in to the second radial pieces, and bear the small arms in clusters at their extremities, have their under sides rounded, and their lateral margins curved up on each side to meet apparently a series of pieces covering them over above. According to Lyon and Casseday these forms also have the vault covered over with solid calcareous pieces—a character not known to occur in *Forbesiocrinus*. Another difference is always observable in the anal side of these types, which in *Onychocrinus*, instead of being occupied by as many pieces as the interradial spaces, or a larger number, as in *Forbesiocrinus*, is often so deeply excavated as to destroy the symmetry of the body, and only occupied by a single row of very small pieces, mounted one upon another, and resting in a sinus in the upper side of the largest subradial, so as to look much like a little dwarfed simple arm. On each side of this little arm-like range of anal pieces, there is a free open space between it and the adjacent rays, whatever may be the number of pieces filling the interradial spaces between the other rays. How this range of little anal pieces (of which there never seems to be more than six or eight) connects with the vault, we have been unable to determine, as they are always, so far as we have had an opportunity to see, entirely disconnected from all parts of the body, excepting the single subradial upon which they rest. We suspect, however, that they may have formed the outside of a small lateral proboscis, the inner side of which was merely covered by a soft dermal integument.

This peculiar character of the anal side, in *Onychocrinus*, seems to have been entirely overlooked or misunderstood in the species of this group referred to *Forbesiocrinus*—the impression being that the anal plates had been, by some accident, removed from their place. It is true, we had observed that the anal area in our *F. monroensis* and *F. Norwoodi* is only occupied by a slender little finger-like appendage, resting upon the upper side of the large odd subradial, but, as stated in our remarks in relation to the former species, we supposed the anal plates had been removed, and that the little rounded finger-like appendage occupying their place, was only one of the smaller subdivisions of one of the arms that had been accidentally placed in that position. We have seen this character, however, in the following species, which we have in the Illinois Report referred to *Onychocrinus*, viz., *Forbesiocrinus asteriæformis*, *F. Whitfieldi* and *F. Meeki*, Hall; also in our *F. monroensis* and *F. Norwoodi*, as well as in the new species described in this paper. In the typi-

* Proceed. Acad. Nat. Sci. Philad., Aug., 1865, p. 138.

cal specimen of *F. Meeki* now before us, the anal space, as may be seen by the figure in the Iowa Report, is entirely vacant, and also without the little row of anal pieces. In five other good examples of this species before us, however, this character is more or less clearly seen.

From the typical forms of *Taxocrinus*, *Onychocrinus* differs in nearly all the characters distinguishing it from *Forbesiocrinus*, as well as in having usually as many interradial pieces as the latter.

As thus separated from *Forbesiocrinus* and *Taxocrinus*, *Onychocrinus* still seems to include two types that may yet be found separable, since *Forbesiocrinus asteriæformis*, Hall, and our species *diversus* described in this paper, differ from the other species mentioned in having the rays more spreading and free in as far as to the second radial pieces, with arms clustered in little bunches at the extremities of the rays far out from the body; and the free rays apparently covered above, at least a part of the way out. It is in this type, if we have correctly understood Messrs. Lyon and Casseday, that they found the vault composed of solid calcareous pieces, while in the other species we have mentioned the vault is unknown.

Such species as our *O. diversus*, described in this paper, with their long, spreading, bifurcating rays, and numerous little curled-up arms at their extremities, must, when perfect, have presented much the appearance of dried specimens of the existing genus *Astrophyton*: but we cannot agree with the authors of the genus or subgenus *Onychocrinus* in the opinion that this type forms a connecting link between the *Crinoidea* and the *Asteroidea*, or that it is more nearly allied to the Star-fishes than other crinoids.

ONYCHOCRINUS DIVERSUS, M. & W.

Body and rays forming together an irregular five-rayed star, the body being comparatively small, depressed, and distorted by the deeper excavation of the anal side; while the rays are large, stout, rigid and free, from the second radial pieces outward, and extend out horizontally on the same plane with the base. Basal pieces hidden by the column, or merely showing as a thin ring scarcely distinguishable from the last segment of the column, when the latter is attached. Subradial pieces comparatively large; four of them equal, wider than long, and all pentagonal, with the upper sloping sides longer than the lateral margins; the fifth one larger (particularly longer) than the others and apparently hexagonal. Radial pieces five to each ray, thick and strong, and after becoming free on the second pieces, curving strongly up on each side of the ray, so as to make the underside of the free rays distinctly rounded; first radial pieces considerably larger than the subradials, of rather unequal size, wider than long, and heptagonal in form, with probably the exception of one or two of those on the anal side, which appear to be truncated on one side, so as to be hexagonal in outline. Succeeding radials diminishing gradually in size, the second and third being wider than long, hexagonal and pentagonal in form, and the fourth transversely oblong, as seen from below; while the fifth is pentagonal, as seen from beneath, having an obtuse middle angle on the outer side. Beyond this the rays are each composed of a double series of strong pieces, which are slightly disposed to assume an alternating arrangement, the two series continuing in close contact laterally to the fourth pieces beyond the commencement of the double series on the fifth radials, and then diverging abruptly at an angle of 90° to 100°, to form distinct rounded branches. At the outer bases of these branches an arm is given off on each side on the third piece from the commencement of the double series, and bifurcates so as to form a bunch of small armlets; beyond this the two main divisions of the rays continue on, each composed of a single range of pieces, until the third piece beyond the lateral arms just mentioned, after which they are each composed again of a double series of pieces, on the third of which another arm is thrown off on each side, and bifurcates as before. After

this each main branch bifurcates without much divergence of the subdivisions, which are short and divided, so as to form together a bunch of small bifurcating arms, thus making altogether apparently not less than several hundred small armlets, or ultimate division of the rays, to the entire series.

The small armlets are all short, and form clusters at the extremities of the divisions of the horizontally extended strong rays, where they curve upwards, and fold together in bunches like the fingers of a clenched fist. They are each composed of a single series of small pieces, which are wider than long, with a minute patelliform piece at the underside of each, as in *Forbesiocrinus*.

Interradials three or four to each space, with others above belonging apparently more properly to the vault; first interradial series hexagonal and resting in a notch between the upper sloping lateral margins of the subradials. Anal series consisting of a single free row of very small pieces resting upon the upper side of the largest subradial, so as to present much the appearance of an abortive armlet. Surface merely finely granular, with the exception of a small linear ridge along the middle of each armlet. (Vault unknown.)

Height of body, exclusive of vault, 0·80 inch; antero-posterior diameter, 0·90 inch; transverse diameter, 1·40 inch; greatest transverse diameter between the extremities of opposite rays, 4 inches; length of each of the two main divisions of each ray, 0·85 inch. Column at its connection with base, 0·28 inch in diameter, and composed of pieces only 0·01 inch in thickness, or ten to the tenth of an inch.

This species is related to *Onychocrinus asteriformis* = (*Forbesiocrinus asteriæformis*, Hall,) but differs in attaining a much larger size, as well as in having the two main divisions of each ray widely divergent and proportionally longer, instead of nearly parallel. Again it differs in having the subdivisions and armlets much more numerous; also in having always five primary radial pieces to each ray.

If reliable characters should hereafter be found for separating generically *Taxocrinus* from *Forbesiocrinus*, it is possible the name of this species would become *Forbesiocrinus* (*Onychocrinus*) *diversus*, unless equally good characters may be discovered for separating the three groups generically. It is quite as probable, however, that *Forbesiocrinus* and *Onychocrinus* may be both included as subgenera under *Taxocrinus*, in which case the name of our species would become *Taxocrinus* (*Onychocrinus*) *diversus*.

Locality and Position.—Burlington group, upper bed; Burlington, Iowa.

Granatocrinus Shumardi, M. & W.

Body elliptic-oval, the length and breadth being as about 67 to 44. Base having the form of a nearly flat pentagonal disc, with moderately prominent angles; columnar facet round, and a little more than half as wide as the base. Radial pieces lanceolate oblong, or nearly three times as long as wide, most projecting and slightly narrower at the lower extremity, nearly flat between the pseudo-ambulacral areas, along the margins of which they project abruptly in the form of a prominent knife-like keel; forming five-sixths the entire length of the body, and each obliquely truncated on each side above, for the reception of the interradials. Pseudo-ambulacral fields very narrow, extending the entire length of the body, with almost exactly parallel sides; rather convex, and each with a moderately distinct, longitudinal mesial linear furrow, on each side of which about 65 pore pieces may be counted; lanceolate and supplementary pore pieces unknown. Interradial pieces about one-fourth the entire length of the body, rhombic in outline, or widest in the middle, and tapering nearly equally to the upper and lower extremities; all rather distinctly sloping inwards from the lateral angles to the middle, so as to present a notched appearance on the outer surfaces. (Openings of the summit unknown.) Surface showing, by the aid of a good magnifier, in a cross light, microscopic longitudinal lines near the lower end of the radial

pieces, and on the interradials much stronger lines parrallel to their inferior sloping sides.

Length, 0·67 inch; breadth, 0·44 inch.

At a first glance, this species might be mistaken for the common *Pentremites melo*, of Owen and Shumard, from which it may be readily distinguished by several well marked characters. In the first place it is narrower in proportion to length, and differs in having its pseudo-ambulacral areas prominent instead of sunken, and bounded on either side by a sharply elevated thin carina; while its interambulacral areas are flat, or even a little concave, towards the lower part of the body, instead of being convex. It likewise differs in having scarcely a visible line, instead of a deep furrow along the sutures between the radial pieces; while its base is much larger, and not sunken, but on a level with the lower ends of the radial pieces, which are likewise more protuberant at the lower ends of the pseudo-ambulacral fields.

In its larger and more prominent base, our species agrees more nearly with a form described by us as a variety of *P. melo*, under the name *P. melo*, var. *projectus*, from which, however, it differs in all the other peculiarities mentioned. We now regard that form as a distinct species from *P. melo*.

Compared with *P. elongatus*, of Shumard, which it resembles in general form, it will be at once distinguished by its greatly narrower and more prominent pseudo-ambulacral areas, larger radial pieces, and proportionally larger interradials, which extend up to near the centre of the summit. These two forms may be regarded as the connecting links between the true *Pentremites* (*P. Godoni* group) and the *P. melo*, or *Granatocrinus* group. *P. elongatus*, however, falls clearly into the former, while the form under consideration belongs to the *melo* group.

Named in honor of Dr. B. F. Shumard, of St. Louis, Missouri, who has given more attention to the *Blastoidea* than any other person in this country.

Locality and position.—Burlington, Iowa, lower part of Burlington group of Subcarboniferous series. Mr. Wachsmuth's collection.

GRANATOCRINUS NORWOODI, O. & S. ?

Amongst some interesting Crinoids, loaned us for investigation by Mr. Wachsmuth, from the Burlington group at Burlington, Iowa, there is a beautiful specimen, resembling *G. Norwoodi* more than any other species known to us, with all the numerous little jointed, thread like arms, and a portion of the column attached. So far as we know, this is the only specimen of this group ever found with the arms attached. As might have been inferred from analogy, the arms in this type are apparently, in all respects, exactly as in the true *Pentremites*. About thirty of them can be counted arising from each pseudo-ambulacral area, though this is probably not the entire number, as they are folded together so that many of them may be hidden. They are very slender, simple, of uniform size, without any perceptible taper, and composed each of a single row of pieces as long as wide, of which about seven may be counted in the space of 0·10 inch. We are not sure they are entire, though it is evident that those attached near the lower part of the areas must be at least twice as long as the body. The column near the base is round and composed of thin pieces of equal size, but farther down there are wider ones, with smaller between at regular intervals.

The body of this specimen is partly hidden by the arms, but as far as can be determined it is as stated above, much like *G. Norwoodi*, with the following differences: In the first place, the parts of its radial pieces forming the interambulacral spaces are not more than half as wide as in specimens of *G. Norwoodi* of the same size. These surfaces also slope inwards laterally, so as to form a rather deep groove along the suture between each two radial pieces, instead of forming a flat area across between the pseudo-ambulacra, as in *G. Norwoodi*. Again its pseudo-ambulacral areas are proportionally nearly twice as wide as in *G. Norwoodi*, while the portions of the surface exposed are more coarsely granulated than in that species, and the granules differently arranged. As it seems

to be also less like *G. melo*, or any of the other species known to us from this horizon, we suspect it will be found to belong to an undescribed species, but as we have not seen the summit, nor base, we are left in doubt on this point. Should it prove to be new, however, we would propose for it the name *G. fimbriatus*.

Locality and position.—Upper beds of Burlington group, of Subcarboniferous series, Burlington, Iowa. Mr. Wachsmuth's collection.

ASTEROIDEA.

SCHŒNASTER WACHSMUTHI, M. & W.

Body flattened, with a regular, distinctly pentagonal outline, the angles being produced into five rather attenuated rays or arms, which are a little convex above, and apparently as much as two-thirds as long as the diameter of the disc, if not more. Disc concave in outline on the outer margin between the rays, and imparting a slightly alate character to the latter, by extending a little along their inner lateral margins; like the dorsal side of the rays, composed above of numerous small, slightly convex plates. Dorsal pores moderately distinct between the plates. Plates of the under side of the disk about as large as the dorsal plates, but flattened, scale-like, crowded, and having the inward imbricating character of the genus very strongly marked. Ambulacra (as seen in a compressed specimen) very narrow, their adambulacral plates moderately large, oval-oblong, comparatively thin, and very strongly imbricating outwards or towards the extremity of the rays. Between these two rows of short, flattened spine-like scales are seen arising from the ambulacral furrow, and all inclining outwards toward the outer extremities of the rays. (Other characters unknown.)

Diameter of disc, 1·22 inch; rays apparently extending as much as 0·90 inch or more beyond the margins of the disc.

This species will be readily distinguished from our *S. fimbriatus*, from the St. Louis limestone, the only other known species of the genus, by its smaller and less convex plates on the dorsal side, as well as by its much thinner, less oblique and more strongly imbricating row of plates along each side of the ambulacra, and particularly by its much narrower ambulacral furrows. We have not seen any traces of the row of short flattened marginal spines seen around the disc of *S. fimbriatus*, nor have the similar little appendages seen arising in a double row from the ambulacra of the species under consideration been seen in *S. fimbriatus*, but it is probable these are generic characters that exist in good specimens of both species. There may have also been similar little flattened spines on other parts of the fossil, as there are some appearances of such little appendages projecting from the transverse sutures between some of the rows of imbricating adambulacral plates.

We take pleasure in naming this interesting species after Mr. Charles Wachsmuth, of Burlington, Iowa, its discoverer, to whom science is indebted for the discovery of many interesting new types of fossils.

Locality and position.—Burlington, Iowa; upper part of Burlington limestone of Subcarboniferous series. Mr. Wachsmuth's collection.

MOLLUSCA.

LAMELLIBRANCHIATA.

PTERIA (PTERINEA ?) MORGANENSIS, M. & W.

Shell (left valve) exclusive of the posterior wing, obliquely subovate, moderately convex, very thin; anterior and basal margins forming an obliquely descending, semi-oval, or semi-circular curve, from the anterior ear to the posterior margin, which is prominently and rather narrowly rounded; hinge line somewhat less than the length of the shell, and ranging at an angle of about 45° above a line drawn from the beak to the most prominent part of the

posterior basal margin; beak oblique, rather convex, and placed very near the anterior extremity of the hinge; anterior ear very small, a little convex, but separated from the swell of the umbo by an oblique, shallow, rounded impression,—rounded at the extremity, and defined in outline by a very shallow marginal sinuosity; posterior wing large, flattened, triangular, and defined by a broad, moderately deep rounded sinus,—not equalling in length the most prominent part of the posterior margin below the sinus—in young shells rather acutely angular, but more obtuse in adult specimens. Surface ornamented with numerous linear, radiating costæ, smaller than the flattened spaces between, and crossed by concentric raised lines, so as to form a neat cancellated style of marking, quite as distinct on the ears (particularly the posterior one) as on the body of the valve; radiating costæ increasing by intercalation, the intermediate ones dying out at various distances between the free margin and the beak, all more or less interrupted at various intervals by irregular, shallow, concentric furrows of growth. (Right valve unknown.)

Length of the largest specimen, measuring obliquely from the most prominent part of the posterior basal margin to the extremity of the small anterior ear, 1·55 inch; do. parallel to the hinge line, 1·41 inch; height at right angles to the hinge, 2 inches; length of hinge and anterior ear, 1·17 inch; length of posterior ear, from the beak to its extremity, 0·91 inch.

This rather handsome species has more the aspect of certain Upper Silurian forms, such as *Avicula communis*, Hall, than of any carboniferous species with which we are acquainted, though of course presenting well marked specific differences.

It is a little remarkable, that all of the twenty-five or twenty-six specimens now before us, are left valves, from which fact we may infer that the right valve, being more fragile, was generally broken to pieces by the waves, before being imbedded in the sediment. It is also probable that the right valve was less convex, and more faintly marked than the other, as is usual in shells of this kind. As we know nothing of the hinge and muscular impressions of this shell, we cannot determine whether it is a *Pterinea* or a *Pteria*. If a true *Pteria*, and Kleins old pre-Linnæan names are to be retained, the name of our shell will become *Avicula morganensis*.

Locality and position.—Coal Measures (below the middle), Morgan County, Illinois.

DOLABRA STERLINGENSIS, M. & W.

Shell rhombic-cordate, being cordate in outline, as seen in an anterior and posterior view, and obliquely rhomboidal as seen from either side. Posterior margin obliquely truncated, with a long slope, which is slightly convex above and faintly sinuous near the middle; posterior basal extremity produced obliquely backwards and downwards, with a more narrowly rounded or subangular outline; basal margin ascending forward, with a moderately convex curve, and rounding up more or less gradually into the very short or almost obsolete anterior side; hinge line short; cardinal area moderately developed. Beaks prominent, placed nearly over the anterior margin, strongly incurved, and compressed antero-posteriorly; umbonal ridges very prominent, subangular, and extending from the beaks obliquely to the posterior basal extremity at an angle of about 68° below the horizon of the hinge, thus dividing each valve into two subequal areas, of which the one behind is flattened or slightly concave between the ridge and the moderately prominent postero-dorsal edge, and that in front and below it convex. Surface marked with concentric striæ of growth. (Hinge and interior unknown.)

Greatest length, measuring obliquely from the beaks to the posterior basal extremity, 2·20 inches; diameter at right angles to the same, 1·50 inch; convexity of the two valves when closed, 1·50 inch.

This species is evidently related to *Cyrtodonta Hindi*, of Billings (see Palæozoic Fossils of Canada, vol. 1, p. 151, fig. 131, a, b), from the same

geological horizon. It differs, however, in several important specific characacters, being proportionally much more gibbous, shorter, and, in consequence of its hinge line forming a wider angle with its umbonal axis, distinctly less oblique. It also differs in having its anterior side much less prominent and more broadly rounded below the beaks, which consequently have the appearance of being almost terminal. Its beaks are likewise more compressed antero-posteriorly, and its hinge line shorter. Our specimen does not show the cardinal area very satisfactorily, though it is evidently moderately well developed and shorter than in Mr. Billings' species.

Until the hinge and interior of this shell can be examined, it is scarcely possible to determine very clearly its generic character, but on comparison with *Cucullæa angustata*, Sowerby, the type of McCoy's genus *Dolabra*,* and other more obliquely truncated species, such as *C. unilateralis*, Sowerby, *C. amydalina*, Phillips, as figured in Phillips' Palæozoic Fossils, we can scarcely doubt the propriety of referring it to the genus *Dolabra*. Some of these species have much the form and general external appearance of the genus *Cucullæa*; while Sowerby's figure of an internal cast of the so called *C. angustata* (Geol. Trans. (2), vol. v. pl. 53, fig. 25), seem to indicate a very similar hinge. They appear to want the prominent posterior muscular support and the radiating costæ or striæ of the more modern species of true *Cucullæa*, of which, however, they are evidently palæozoic representatives.

Locality and position.—Cincinnati group, of Lower Silurian Series, at Sterling, Illinois.

MACRODON MICRONEMA, M. & W.

Shell rather small, very inequilateral, elongate-oblong, nearly twice and a-half as long as high, rather distinctly convex in the anterior and central regions, as well as along the oblique posterior umbonal slopes. Posterior dorsal region compressed above the umbonal ridge. Cardinal margin straight, nearly parallel to the base, and but little shorter than the valves. Ventral margin long and straight, or but slightly sinuous in the middle, and rounding up rather abruptly and nearly equally at the ends. Posterior extremity truncated, with a slight forward inclination, sometimes faintly sinuous in outline. Anterior side very short and rounded. Beaks rather depressed, but rising moderately above the hinge and somewhat flattened on the outer side; incurved, approximate, and placed near the anterior end. Surface ornamented with radiating striæ, which are oblique, coarse, and rather irregular on the compressed posterior region, but become gradually less oblique, finer and more regular anteriorly, so that on the middle and anterior portions of the valves they are exceedingly minute, very regular, and only visible by the aid of a good magnifier in a cross light. A few moderately distinct marks of growth are also seen near the basal and posterior margins. (Hinge, area and interior unknown.)

Length, 0·65 inch; height (at beaks), 0 28 inch; convexity, 0 24 inch.

This little shell has much the form and general appearance of *Macrodon carbonaria*,=(*Arca carbonaria*, Cox, Kentucky Geol. Report, pl. viii. fig. 8), but may be readily distinguished, not only by its smaller size and less nearly terminal beaks, but by the extremely minute size of its radiating striæ on the convex portions of its valves.

Locality and position.—St. Genevieve County, Missouri, in the Chester division of the Subcarboniferous series, also in the same position, Randolph Co., Illinois.

* The genus *Dolabra*, as first proposed by Prof. McCoy, included along with the typical species, such as *Cucullæa angustata* and *C. unilateralis*, Sowerby, *C. amydalina*, Phillips, &c., other forms belonging to the subsequently established genus *Schizodus*, King. After the separation of the latter group, however, the name *Dolabra* was of course left for the other genus.

GASTEROPODA.

Genus PLATYCERAS, Conrad, 1840.

(*Acroculia*, Phillips, 1841.)

The genus *Platyceras* was proposed by Mr. Conrad for a group of palæozoic shells, very generally referred by European authors to the Montfort's genus *Capulus*, published in 1810,- (*Pileopsis*, Lamarck, 1812.) Mr. Conrad's description of this genus reads as follows: "I propose to group in this genus the *Pileopsis tubifer*, (Sowerby), *P. retusa*, (Sowerby), *Nerita haliotis*, (Sowerby), and perhaps *Bellerophon cornucriettes*. These shells are suboval or subglobose, with a small spire, the whorls of which are sometimes free and sometimes contiguous; the mouth is generally campanulate or expanded."* During the following year, Prof. Phillips proposed in his "Palæozoic Fossils," p. 93, the name *Acroculia* for the same fossils.

In this country Mr. Conrad's name has been generally adopted for these shells, which is certainly proper, unless they shall be found to agree with the older genus *Capulus*, since his name has priority over that proposed by Prof. Phillips. Although agreeing with those who regard these fossils as being probably distinct from the existing genus *Capulus*, we believe they are more nearly allied to that group than is generally supposed to be the case by American palæontologists. The only reason assigned by Professor Hall for separating them from the modern genus is, that he had never observed in them any traces of the peculiar horse-shoe shaped muscular scar so conspicuous in the genus *Capulus*.† We have recently, however, found very similar muscular impressions in two distinct species of this genus, one of which seems to be a variety of *P. subrectum*, Hall, from the Keokuk group, while the other is a new species described in this paper from the Waverly Sandstone, of Ohio.‡ In both of these, internal casts show an elongate oval muscular impression on each side, connected by a linear band passing around behind. It is also worthy of note that both of these species belong to the nearly or quite straight section of the genus, for which Prof. Hall at one time proposed the name of *Orthonychia*,§ and hence are less nearly like the modern typical forms of the genus *Capulus* than the great majority of the Palæozoic species.

A careful examination of extensive collections of these shells from our western palæozoic rocks, has also satisfied us that the animal must have been similar in habits to *Capulus* and other types of the family *Capulidæ*, to which they evidently belong||, in being sedentary shells. This is shown by specimens found attached to crinoids and other objects in such a manner that the sinuosities of the lip exactly correspond to the irregularities of the surface to which they are attached. For instance, we have now before us one of these shells attached to the side of a *Pentremites Godoni*, so as to entirely cover one of the pseudo ambulacral fields and two of the intermediate areas, and yet the sinuosities of its lip conform so exactly to the irregularities of the side of the

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* Palæontological Report, New York, 1840, p. 205.

† 12th Ann. Report Regents University New York, p. 16. 1859.

‡ Similar muscular impressions are known to occur in the *Neritidæ* and other univalves.

§ Report 4th Dist. N. Y., 1843.

|| In a sheet entitled "Iowa Geological Survey, supplement to vol. 1, part II, 1859," issued in 1860, Prof. Hall described a patelliform *Platyceras*, from Nauvoo, Illinois, under the name *P. fissurella*, which he says has a perforation just anterior to the apex. Although this is merely mentioned as a specific character, distinguishing it from an otherwise similar species described in the same paper, conchologists will readily understand that such an opening, near the apex of the shell, if natural, must have been, judging from all analogy, for an excurrent or anal siphon, as in the *Fissurellidæ*, and hence would not only remove the species from the genus *Platyceras*, but from the family *Capulidæ*, and place it in the *Fissurellidæ*, regarded by the best systematists as belonging to a distinct order from that including the *Capulidæ*. A careful examination, however, of the typical specimens of *P. fissurella*, and other examples of the same species from the original locality, now in the possession of one of the writers, leads us to think the perforation alluded to (which only exists in one of the specimens), almost beyond doubt an accidental break in the shell, not a natural perforation

Pentremite that the fit looks as if it might have been air tight. The corresponding undulations of the lines of growth likewise show clearly that this nice adaptation of the margins of the lip to the irregularities of the surface of the *Pentremite* could not have resulted from accidental pressure when the edge of the lip was somewhat yielding, since these curves in the marks of growth are seen to extend up the sides of the shell some distance from the margin, where there could have been no flexibility.

This habit of attaching themselves to Crinoids, has led some to think the crinoids were in the act of devouring these mollusks at the moment when they perished, and that these mollusks constituted the chief food of the crinoids. So far as our observations go, however, we do not think the evidence sufficient to establish this fact, since these shells are as often attached to the side of the crinoid below the horizon of the arms as to the summit, and hence out of reach of the mouth, while the conformity of the margins of the shell to the inequalities of the surface to which they are found attached, rather indicates that they grew there. The probability seems to be, that like various other sedentary marine animals, these mollusks, in their very young state, floated freely about until they found a suitable place to attach themselves. We were at one time inclined to think there might also be some reason for believing that the adult shell at least sometimes changed its station, from the fact that in some instances we observe the lines of growth indicating strong sinuosities in the lip during a part of the growth of the shell, which afterwards became suddenly obliterated, to give place to a different set of irregularities, as if the animal had changed its stat on and adapted the sinuosities of its lip to a new surface. This, however, may have been produced by the lateral expansion of the lip, by which it was brought into contact with different inequalities as the shell increased in size. We have no evidence that they possessed the power of excavating a depression in the surface of attachment, as in *Amalthea*, or of secreting a shelly layer or support under the foot, as in *Hipponyx*.

Prof. Hall has proposed to establish two subordinate groups under this genus, more or less distinct from the typical forms of *Platyceras*. These may be distinguished thus :—

1. *Platyceras*, Conrad. (Typical.) Shell with apex incurved or spiral; surface concentrically striated, sometimes radiately plicate, rarely spiniferous. *Pileopsis tubifer*, Sow.

2. *Orthonychia*, Hall. Shell arched or straight, with concentric striæ. *Platyceras subrectum*, Hall.

3. *Lyoceras*, Hall. Differing from the last in having the surface cancellated. Ex. *P. plicatum*, Conr.

It is, however, often very difficult to separate the species into these groups, owing to the numerous gradations by which they blend into each other.

Platyceras lævigatum, M. & W.

Shell small, dextral, subglobose, composed of two to two and a-half very rapidly expanding contiguous whorls, the first of which is minute; last whorl forming much the larger part of the shell, evenly convex, and although increasing rapidly in size, not properly campanulate; aperture nearly circular, being somewhat straightened on the inner side; lip not sinuous in any of the specimens examined; surface nearly smooth, but showing fine lines of growth under a lense, where not worn.

Length, 0·55 inch; breadth, 0 38 inch.

This little shell is not very nearly related to any of the other carboniferous species of this country with which we are acquainted. It will be readily identified by its small size, rapidly expanding whorls, smooth surface, without folds or plications, and the non-sinuous, regular outline of its lip. From the latter character, it would seem to have attached itself only to even surfaces. In size and the regular smoothness of its surface it is quite similar to

P. bivolve, of White & Whitfield, from the Kinderhook group; but it may be readily distinguished by its much more rapidly expanding whorls and consequently larger aperture. It also differs in having the apex of its spire distinctly sunken below the upper side of the body whorl, instead of nearly even with it.

Amongst foreign species, ours is perhaps most nearly allied to *Pileopsis angustata*, of Phillips (Geol. Yorks. 11, pl. xiv, fig. 20), from which it also differs in having its whorls much more rapidly expanding, and its aperture proportionally much larger and more rounded.

Locality and position.—St. Genevieve county, Missouri, and Randolph county, Illinois; from the Chester division of the Subcarboniferous series.

PLATYCERAS HALIOTOIDES, M. & W.

Shell rather small, ovate, very oblique and depressed; composed of two very rapidly expanding, nearly or quite contiguous volutions, the last one of which is depressed above, narrowly rounded around the dorsal side, and forms nearly the entire bulk of the shell; apex of spire on a plane with upper side of the body whorl; aperture large, transversely oval, being wider than high; lip sometimes sinuous on the outer or dorsal side; surface with moderately distinct lines of growth. Exfoliated surfaces sometimes showing apparently traces of revolving striæ.

Length, 0·73 inch; breadth, 0·54 inch; height, 0·41 inch.

This species will be recognized by its very oblique depressed form, and the narrowly round character of the outer side of its body whorl, which peculiarities give it much the form of a *Haliotis*. Its first turn, which is quite small, seems to have been sometimes free or slightly detatched from the body of the shell, and in other examples in contact with it. The marks of growth generally indicate a rather broad, moderately deep sinuosity of the lip on the dorsal or outer side.

Locality and position.—Waverly sandstone, fifty feet below the Millstone grit, Richfield, Summit county, Ohio.

PLATYCERAS UNCUM, M. & W.

Shell rather under medium size, in adult examples elongate conical and oblique; body portion nearly straight, especially on the posterior side; apex attenuate, pointed, laterally compressed and curved backwards (without any lateral obliquity), so as to form a free hook of about half a turn. Aperture generally a little wider transversely than the antero-posterior diameter, and usually showing a faintly subtrigonal outline, produced by the prominence of the front, and the flattening of the posterior side of the body. Lip irregularly undulated, prominent on each side, broadly sinuous behind and provided with a very deep narrow sinus in front. Surface with the usual undulating concentric striæ crossed on the lower half of the body by small, rather obscure longitudinal plications, and in front by a larger, but narrow prominent ridge, upon which the lines of growth make a strong upward curve, so as to indicate the presence of the anterior sinus during most of the growth of the shell.

Length, 1 inch; breadth (transverse diameter of the aperture), 0·70 inch; antero-posterior diameter of the aperture, 0·55 inch.

This species is intermediate in size and some other respects between *Platyceras acutirostris*=(*Capulus acutirostris*, Hall), and *Platyceras equilatera*, Hall. In size and general appearance it is most like the former, though it is larger and differs in having its apex merely hooked instead of subspiral, as well as in its prominent anterior ridge and deeper and narrower anterior sinus. From *P. equilatera* it is distinguished by its smaller size, narrower and straighter form (particularly at maturity), less incurved beak, prominent anterior ridge, deep anterior sinus and portionally smaller aperture. It also wants the antero-lateral sinuses of the lip seen in the typical forms of that shell.

It is quite evident that the nature and position of the sinuosities of the lip, as already suggested, in all the species of this genus, were modified to a considerable extent by the nature of the surface to which the animal was attached during life. A careful examination, however, of large collections of most of the known American palæozoic species, shows that there was generally a *tendency* towards a uniformity in the sinus and the corresponding longitudinal ridges, when present, in each species, particularly in those of Carboniferous age.

Locality and position.—Keokuk limestone, of the Subcarboniferous series, at Nauvoo, Ill.

PLATYCERAS (ORTHONYCHIA) CHESTERENSE, M. & W.

Shell small, obliquely conical, more or less arched; apex sometimes rather attenuate, curved or directed backwards so as to stand nearly over the posterior margin; anterior and lateral sides expanding rather rapidly from near the apex; aperture irregularly subcircular; lip margin more or less undulated. Surface marked by fine undulating concentric striæ of growth, and usually with about five rather broad radiating furrows that extend from the lip to the middle or above, so as to leave between them five broad obtuse ridges, which are themselves sometimes faintly divided into smaller irregular costæ near the margin of the lip.

Height, or length, measuring from the anterior basal margin obliquely to the apex, 0·66 inch; transverse breadth of aperture, 0·55 inch; longitudinal do. of same, 0.53 inch.

The most marked feature about this little shell is the rather general presence of about five radiating furrows extending sometimes from near the apex to the margin, so as to divide the surface into about five broad ridges, sometimes themselves faintly subdivided. This character is not in all cases distinctly defined, though the specimens generally show indications of it, while in some instances it is a very conspicuous feature. In this character it is much like the Burlington group species, *P. quincyense*, of McChesney, from which, however, it is distinguished by its much smaller size, more rapid expansion and more arcuate oblique form.

It is a specimen apparently of this species to which we have already alluded as being attached to the side of a *Pentremites Godoni*. The individual so attached is less attenuate, and has the five furrows less defined than the typical specimens of the species, but it nevertheless seems to belong to this species.

Locality and position.—Chester division of the Subcarboniferous series, Chester, Illinois; also in same position Pope county, Ill.

PLATYCERAS (ORTHONYCHIA) SUBPLICATUM, M. & W.

Shell small, depressed conical, somewhat oblique, rapidly expanding from a subcentral apex; anterior slope slightly convex; posterior and lateral slopes straight or a little concave; aperture subcircular; adductor muscular scars finely striated and placed a little above the middle on each side; elongate-subovate or sublunate, being a little arched, with the larger end forward and raised slightly higher than the other, and the posterior ends connected by a linear depression running around behind; surface (of casts) with a few large, irregular radiating folds or plications extending from the margins of the aperture more than half way up towards the apex.

Height, 0·36 inch; antero-posterior diameter, 0·63 inch; transverse, do., 0·56 inch.

We have only seen internal casts of this species, which probably do not give a very correct idea of the nature of the apex, which in the casts is rather obtuse and merely directed somewhat obliquely backwards and upwards. In perfect shells it is doubtless pointed and more or less incurved. The plications of the surface are obtuse and rather obscure in the internal casts. The sur-

e of the shell is probably also marked with more or less distinct lines of owth. The internal casts show very satisfactorily the muscular scars.

This species has somewhat the general form of *P. fissurella*, of Hall, but smaller, less oblique, and differs in the possession of large radiating lications.

Locality and position same as last.

PLATYCERAS (ORTHONYCHIA) INFUNDIBULUM, M. & W.

Platyceras subrectum, Hall, 1860. Supplement to Iowa Report, page 1, of additional sheet; (not *P. subrectum*, Hall, 1859. Twelfth Report Regents Univ., N. Y., p. 18.)

Shell straight, more or less elongate-conical, very slightly oblique, attenuate near the straight subcentral apex, thence expanding, at first gradually, then more rapidly to the irregularly subcircular or suboval aperture; lip thin and irregularly undulated, as if to correspond to an uneven surface of attachment. Surface with more or less distinct, undulating, concentric striæ, and near the lip stronger marks or laminæ of growth; also generally with a few large, irregular, undefined, radiating plications.

Length. 1·40 inch; breadth about 1·30 inch.

As remarked by Prof. Hall, this species varies considerably in the degree of expansion, some specimens being much more attenuated than others. It is probable that in very young individuals the immediate apex may have been curved or subspiral, but in all those we have seen it is straight, sometimes a little compressed, and only removed from a central position by the slight general obliquity of the whole shell without any curve. In some respects it is similar to *P. quincyense*, of McChesney, from the Burlington division of the Subcarboniferous series. It differs, however, even when, as is sometimes the case, it is nearly as strongly plicated as that shell, in its more irregular, less attenuate form and rougher surface, as well as in not having its folds or plications forming five regular, broad ridges, more or less flattened and concave along their middle.

From *P. fissurella*, Hall, the shell here described differs in being less depressed or more attenuate, particularly near the apex, which is never oblique as in that species.

Prof. Hall had described the species under consideration, in the supplementary sheet quoted above, but as he by an oversight gave it the same specific name (*subrectum*) he had previously applied to another species from the upper Helderberg rocks of New York, it becomes necessary, in order to prevent confusion, that our Illinois species should receive another name, and hence we propose to call it *P. infundibulum*.

From the same locality and position with the above, we have a single specimen differing from the others in being greatly more slender and elongated. It is perfectly straight, somewhat compressed laterally and about twice as long as wide, being very attenuate above the middle and but slightly expanded below. It is an internal cast, showing no surface markings, but preserving the transversely elongate-oval muscular scar on each side, apparently connected by a slender band behind. It is not possible to determine beyond doubt whether this is a distinct species or only a variety of that described above, without having more specimens for comparison. Should it prove distinct, however, we would propose to call it *Platyceras (Orthonychia) extinctor*, in allusion to its resemblance in form to a candle extinguisher.

Locality and position.—Keokuk division of the Subcarboniferous series, Warsaw, Illinois.

Genus METOPTOMA, Phillips, 1836.

From Phillips's figures, and very brief diagnosis of the genus *Metoptoma*,* it

* "Patelliform, face under the apex truncate." Geol. Yorks, II, p. 223.

is evident he intended it to include only those patelliform palæozoic shells with the posterior side more or less truncated. Mr. Billings, however, and some others extend it so as to include circular or oval species, showing no traces of the posterior truncation, such as were referred by Phillips and others to *Patella*. Although it is probable the typical truncated and the oval or circular species without the posterior truncation represent two distinct genera, it is perhaps impracticable in our present state of knowledge to separate these groups, owing to the fact that there are so many intermediate forms; while it is very rarely indeed that we can know anything in regard to the interior of these fossil shells.

Phillips says nothing respecting the muscular impressions of his typical species, but his figure of *M. oblonga*, which seems to represent an internal cast, shows apparently a horse-shoe shaped scar, like that seen in *Capulus*, *Hipponyx*, and the allied genera. Prof. de Koninck has also shown (Sup. An. Fos., pl. lviii, fig. 1 and 2) this scar very clearly in *M. pileus* of Phillips, and *M. solaris*,=(*Patella solaris*, de Kon.) From these figures it is evident, as observed by Prof. de Koninck, that the open end of the horse-shoe shaped scar is directed away from the truncated side of the shell, showing that the truncated side is the posterior instead of the anterior, as supposed by Phillips.

METOPTOMA (PLATYCERAS?) UMBELLA, M. & W.

Shell much depressed or patelliform, circular in outline; apex central or very nearly so; sides sloping about equally, with generally a slight concavity, in all directions; surface marked by fine lines and obscure wrinkles of growth. Muscular scar on each side, elongate-oval and somewhat arched downwards, with a narrower band connecting them behind.

Length and breadth each about 1·70 inch; height about 0·70 inch.

Although not an uncommon shell, we have never seen a specimen of this species with the apex entire, though in some of the casts it looks as if it may have been suddenly projecting and possibly curved. Hence, we are in doubt whether it may not fall more properly within the genus *Platyceras*, though it is much more depressed and expanded than any species of that genus known to us. As a general thing, the specimens are regularly circular or slightly oval, and without traces of the peculiar truncation of the typical forms of *Metoptoma*, though some of them seem to show obscure indications of it in the slightly less prominent outline of the margin on one side.

On one single partly-worn specimen, apparently agreeing in other respects with the others, there are indications of small, irregular radiating costæ on the lower half of apparently the anterior side. This may possibly be a distinct species, but we cannot be sure of this without more specimens for comparison, since the typical specimens are mostly internal casts.

Prof. Winchell has described, from the Kinderhook beds at Burlington, Iowa (Proceed. Acad. Nat. Sci., Phila., July, 1865), a somewhat similar species, but judging from its measurements, it must be distinctly less depressed than our shell, and differs in being "contracted at the aperture."

Locality and position.—Burlington division of the Subcarboniferous series, Quincy, Illinois; also in same position on Honey Creek, Henderson county, Illinois.

POLYPHEMOPSIS CHRYSALLIS, M. & W.

Shell subfusiform; spire conical, moderately elevated, pointed at the apex; volutions nine, a little convex and increasing gradually in size, last one forming about two-thirds the entire length and moderately produced below; suture distinct; aperture narrow suboval, acutely angular above and narrowly effuse below; inner lip apparently wanting; columella a little arched and twisted; surface showing only very faint traces of lines of growth.

Length, 0·55 inch; breadth, 0·23 inch; apical angle convex on the slopes, divergence about 40°.

This species has nearly the form of *Loxonema Newberryi*, of Stevens (an elongated *Macrocheilus*), but is much smaller, and wants the characteristic thickening and fold of the columella seen in that species. In size it agrees more nearly with our *Polyphemopsis inornata*, from a higher position in the coal-measures at Springfield, Illinois. It has its body volution more produced below, and less disposed to become subangular around the middle; while the slopes of its spire are more convex in outline, owing to the proportionally larger size of the middle whorls. This latter character gives it the chrysalis-like form that suggested the specific name.

Locality and position.—Hodge's Creek, Macoupen County, Ill. Lower Coal-Measures.

NATICOPSIS LITTONANA, var. GENEVI[illegible]SIS.

Natica Littonana, Hall, 1856. Trans. Abany Inst.,-vol. iv. (p. 30, of extract.)

The shell we here place provisionally as a variety of *Natica Littonana*, Hall (a true *Naticopsis*), agrees almost exactly with authentic examples of that species from the original locality, excepting that it attains some six or eight times the size of the largest of the Indiana specimens, and yet has the same number (four) of whorls. Some of the specimens have the oblique lines rather more distinctly defined around the upper side of the body whorl than we have seen on any of the typical examples of *Naticopsis Littonana*, but this might be expected from their much larger size. These lines, however, are quite distinct on some of the unworn specimens of *N. Littonana*, from Spergen Hill.

Our specimens of the shell under consideration show the inner lip to be little thickened and very smooth, while the columella is moderately flattened. The surface is quite smooth up to the area below the suture, marked by the oblique, very regular striæ, which terminate very regularly and abruptly at their outer extremities. In worn specimens these lines, however, are entirely obsolete. It is not impossible that this may prove to be a distinct species from the *N. Littonana*, though we here place it provisionally as a variety of that species.

Length, 0·73 inch; breadth, 0·67 inch; apical angle about 115°.

Locality and position.—St. Genevieve County, Missouri, and Randolph County, Illinois, Chester division of the Subcarboniferous series.

Genus ANOMPHALUS, M. & W.

Shell depressed, sublenticular, imperforate, smooth and without a spiral band; volutions somewhat embracing above, and each hiding all the preceding ones below; aperture wider than high; peristome not continuous; labium simple and without a notch or sinus, projecting forward above; labium a little sinuous and slightly spreading in the more or less impressed umbilical region.

The type for which this genus is proposed is a little shell having somewhat the aspect of a *Rotella*, but wanting the callus seen filling the umbilical impression in that genus. At a first glance it might be mistaken for a small *Straparollus*, but on examining the under side it is seen to be entirely without an umbilicus, though slightly impressed in the middle; while its lip continues in below nearly to the centre, where it is abruptly deflected upwards, becomes a little thickened, somewhat spreading and more or less sinuous, much as we see on each side of some species of *Bellerophon*.

We have little doubt but this genus belongs to the *Rotellidæ*, which was certainly represented during the deposition of the palæozoic rocks, apparently even by the typical genus *Rotella*,—the well known Devonian *Helicites helicinaeformis* of Schlotheim being apparently a true *Rotella*.

ANOMPHALUS ROTULUS, M. & W.

Shell small, depressed, sublenticular, narrowly rounded on the periphery;

spire scarcely visible above the body whorl in a side view; volutions three and a half to four, increasing moderately in breadth, last one sloping with a moderate convexity between the suture and the periphery, and slightly excavated in the umbilical region; suture not impressed; aperture transversely suboval, being rounded on the outer side and straightened on the lower half of the inner side, but modified by the return of the body whorl above. Surface showing scarcely any traces of lines of growth, even under a good magnifier. (Type of the genus.)

Breadth of a large specimen 0·19 inch; height 0·07 inch.

Locality and position.—Hodge's creek, Macoupen County, Illinois; Lower Coal Measures.

Genus MICRODOMA, M. & W.

Shell small, rather thick, conical, imperforate, composed of flattened whorls, the last one of which is more or less angular around the middle and little produced below; aperture about as high as wide; outer lip simple, straight, and oblique in outline; columella without folds or plications; inner lip thin and slightly reflexed at the base of the columella. Surface with revolving nodular ridges.

We have for several years past had under consideration a number of good specimens of the little shell, for the reception of which this genus is proposed, but delayed publishing a description of it because we were in doubt respecting its generic relations. At a first glance it presents much the appearance of a *Murchisonia*, or a rather elongated *Pleurotomaria*; but even where the outer lip is broken away, so that the sinus characteristic of these genera could not be seen if it had existed, an examination under a good lense shows that it has no revolving band, and that its lines of growth are without the peculiar curve in passing across the whorls, so invariably accompanying the sinus in the lip of *Murchisonia* and other shells of that type. It also resembles some of the small, short species of *Turritella*, but in addition to its shorter, trochiform outline, its outer lip presents an obliquity and straightness of outline that imparts a peculiar appearance to the aperture, not seen in that genus. From our genus *Orthonema*, with which it is associated in the rocks, it differs, not only in its shorter trochiform outline and nodular revolving ridges, but also in its very oblique lines of growth and the consequent obliquity of its outer lip.

It is not easy to determine the family affinities of this type, but it may possibly belong to the *Littorinidæ*. It is probable that *Pleuratomaria serrilimba* and *P. biseriata*, of Phillips, referred by Prof. de Koninck to the genus *Trochus*, may belong to this genus. We doubt the existence of the genus *Trochus*, as properly restricted to such types as the recent *T. niloticus*, Linnæus, during the Carboniferous epoch.

MICRODOMA CONICA, M. & W.

Shell rather elongate conical or subtrochiform; volutions seven, flattened on a line with the slope of the spire, increasing rather gradually in size—last one not much produced below the mesial angle, where it is only marked by minute striæ of growth; suture rather deep; aperture quadrato-suborbicular. Surface ornamented by three distinct, revolving, nodular ridges, the largest and lowest of which occupies the mesial angle of the body whorl, and passes around immediately above the suture of the whorls of the spire, while the upper one occupies the upper margin of all the whorls just below the suture, and the third one passes around midway between the others. Lines of growth small and crossing the flattened sloping sides of each whorl obliquely, so as to indicate a distinct forward extension of the outer lip at its connection with the body whorl above. Nodes of the revolving angles small, closely and regularly arranged on the different ridges, so as to form oblique rows parallel to the lines of growth.

Length, 0·21 inch; breadth, 0·12 inch; apical angle, 36°.

This species seems to be much like *Pleuratomaria serrilimba*, of Phillips, judging from his figure, (Geol. Yorks. 11, pl. xv. fig. 30); but it is utterly impossible to make satisfactory comparisons with species so briefly described and poorly figured, without having access to authentic specimens.

Locality and position.—Macoupen County, Ill. Lower Coal Measures.

ORTHONEMA CONICA, M. & W.

Shell elongate conical, thin. Volutions (in adult shells) about nine, flattened nearly on a line with the slope of the spire, or but slightly convex; lower ones sometimes a little projecting at their lower margins immediately above the suture; last one distinctly angular around the middle, and but moderately produced below the angle, where it is a little convex. Umbilical region not indented. Suture generally well defined between the lower whorls, and merely linear above. Aperture rhombic subquadrate. Surface showing, under a magnifier, small, very slightly oblique lines of growth, which are sometimes crossed on the middle of the flattened outer slope of the body whorl, by very faint traces of two revolving ridges, and below the angle, on the under side, by traces of another revolving ridge.

Length, 0·70 inch; breadth, 0·30 inch; apical angle a little convex on its slopes, divergence about 30°.

This species will be readily distinguished from our *O. Salteri*, from the same locality and position, by its larger size, smaller number of whorls, greater apical angle, and particularly by never having the two linear revolving ridges just below the suture, so characteristic of that species. As mentioned in the description, it sometimes, though rarely, shows traces of two very obscure revolving ridges on the flattened part of the body whorl, but these are midway between its principal angle and the suture, while those on *O. Salteri* are always very distinct, and placed just below the suture. The principal angle on the body whorl of *O. Salteri* is also much more distinct, being a true carina.

From the several species of *Polyphemopsis* of our coal-measures, such as our *P. inornata*, *P. peracuta*, &c., which it somewhat resembles, this species will be distinguished by its angular body whorl; and particularly by not having this whorl produced below, and its columella curved outwards and truncated, so as to produce the peculiar effuse character of the base of the aperture seen in that genus.

Locality and position.—Hodge's Creek, Macoupen County, Ill. Lower Coal Measures.

TROCHITA? CARBONARIA, M. & W.

Shell small, depressed trochiform, or broadly conical, about twice as wide as high, circular in outline as seen from above; periphery alate and very sharp, not serrate or crenate; apex central, mammillated; volutions about five, flattened or a little concave in the middle; suture merely represented by a nearly obsolete line scarcely visible without the aid of a magnifier; aperture unknown; umbilicus small, infundibuliform. Surface smooth on the upper whorls, but showing moderately distinct, extremely oblique lines of growth on the last turn.

Breadth, 0·35 inch; height, 0·17 inch; apical angle about 105°.

This little shell resembles quite nearly *Trochella prisca*, of McCoy, from the Carboniferous limestone of Ireland; from which it differs in its much smaller size, and moderately distinct lines of growth. So far as we know, it is the first shell of this type ever found in our American Palæozoic rocks. Its alate margin seems to project as a sharp rim around the periphery, and the general aspect of the shell is very like that of the genus *Phorus*, though we have been unable to see any indications of foreign bodies being attached to the margin. We are not sure, however, but we would be nearer right in calling it *Phorus carbonarius*, or *Onustus carbonarius*.

Locality and position.—St. Genevieve Co., Missouri; Chester division of the Subcarboniferous series.

PLATYSCHISMA HELICOIDES, Sowerby? (sp.)

The specimens before us agree so exactly with the figures and descriptions of Sowerby's *Ampullaria* (*Globulus*) *helicoides*, from the English Mountain limestone, that we are completely at a loss to find any characters by which it can be distinguished. The largest of them are somewhat smaller than the average size of English specimens, and none of them are so depressed as the form for which Phillips proposed the name *Natica elongata;* their outline being more nearly like Sowerby's fig. 2, pl. 522, Min. Con. On comparison with specimens of the Belgian form from Tournay (usually referred to Sowerby's species), which they never equal in size, and which seem to us probably distinct from the English species, they are found to differ in having the whorls less rounded above, and the revolving striæ within the small umbilicus coarser. The surface is quite smooth, the apex rather obtuse, and some of the specimens show indications of the faint sinus in the outer lip, which has caused the European specimens to be sometimes referred to the genus *Pleurotomaria*. There are no traces of a spiral band, however, and some individuals seem to have had no notch or sinus in the lip.

Locality and position.—Chester limestone, of the Subcarboniferous series, St. Genevieve Co, Missouri; where it is quite abundant, and occurs with a *Nautilus* (*Trematodiscus*) we cannot distinguish from *N. sulcatus*, Sowerby.

PLEUROTOMARIA CONOIDES, M. & W.

Shell small, regularly conoid-trochiform, longer than wide, the breadth being to the length about as five to six. Volutions five or six, increasing regularly and rather gradually in size,—all obliquely flattened nearly parallel to the slope of the spire, though the lower margin of each projects at the suture slightly beyond the upper edge of the succeeding one below; last one angular around the periphery at the base, and flattened on the under side at less than a right angle to the oblique slope above, but rounding abruptly into the minute umbilical perforation within. Aperture rhombic quadrangular, with nearly equal length and breadth; inner lip straight and parallel to the axis of the shell below, but curving out abruptly at its base. Surface ornamented with small, regular, oblique, arching striæ on the upper sloping sides of the whorls, and minute sigmoid lines, crossed near the periphery by faint traces of a few revolving striæ, on the under side of the body whorl. Spiral band narrow, located at, or slightly above the periphery of the body volution, and passing around its own breadth above the suture on the whorls of the spire; margined above and below by a raised line.

Length, 0·27 inch; breadth, 0·23 inch; apical angle regular, divergence about 50°.

This species belongs to the trochiform section of the genus, including *Pleurotomaria obtusispira*, and *P. Riddellii*, Shumard; *P. turbiniformis*, M. & W., and *P. Missouriensis*, Swallow, (sp.) It differs from all these shells, however, in being much smaller, although composed of about the same number of whorls; while it also differs from them all excepting the *P. obtusispira* in having no revolving striæ on the upper side of its whorls, and from that species in having a more elevated spire, and rather coarse, instead of "extremely fine, striæ of growth" on the upper slope of its whorls. In form and general appearance it resembles quite nearly *Trochus coniformis*, de Koninck (An. Foss. pl. xxxvii. fig. 4, a, b,)* but differs in wanting the spiral striæ, and of course in the possession of a distinct, but narrow spiral band.

*This shell resembles so closely in form, surface markings and general outline, several of our American Carboniferous species of *Pleurotomaria*, that in case it had been described by a less experienced palæontologist than Prof. de Koninck, we should have suspected it to belong to that genus instead of being a true *Trochus*. In our *Pleurotomaria turbiniformis*, for instance, and the beautiful species described by Prof. Swallow under the name *Trochus Missouriensis*, the spiral band is so very narrow and inconspicuous as to be easily overlooked, when the margin of the lip is broken away.

Locality and position.—Hodge's Creek, Macoupen County, Ill. Lower Coal Measures.

PLEUROTOMARIA COXANA, M. & W.

Shell attaining a large size, obliquely conoid-subtrochiform, longer than wide; spire turreted, forming rather more than half the entire length. Volutions six to seven, convex, very prominent or obtusely subangular below the middle, at which point those of the spire project out over the suture; all flattened or slightly concave above, with an outward slope of about 35° to the axis, from the suture to the most prominent part, where the spiral band is placed; below this the underside is rounded convex to the small umbilical perforation. Suture strongly defined by the convexity of the whorl just above it. Aperture subquadrate, approaching subcircular in adult shells. Surface ornamented by exceedingly fine, regular lines of growth, that run very obliquely backwards, with a slight forward curve in passing down the sloping upper side from the suture to the spiral band at the most prominent part of the whorls; between this and the umbilical perforation below they make a backward curve. Casts also show some traces of much stronger revolving lines in the umbilical region.

As is not uncommon in species of this type, the divergence of the apical angle varies considerably with age, being greater in young than adult shells. In internal casts there is a moderately distinct umbilical perforation, which seems to be very small, or nearly closed in specimens retaining the shell. The lines of growth are exceedingly fine and regular, without any traces of revolving striæ, excepting near the umbilicus, and we are not sure they really exist there, as only traces of apparently such lines have been seen.

This shell will be readily distinguished from all of those known to us, approaching it in size, such as *P. tabulata*, Conrad, and *P. subscalaris*, M. & W., by its more oblique form, more sloping and less angular whorls, as well as by the absence of any traces of revolving striæ on the upper slope of its whorls.

The specific name is given in honor of Prof. E. T. Cox, of New Harmony, Indiana, to whom we are indebted for the use of the best specimen of the species we have seen.

Locality and position.—Iron ore beds of Lower Coal Measures, at Nolan's Furnace, Edmondson Co., Kentucky.

PLEUROTOMARIA SPIRONEMA, M. & W.

Shell rather under medium size, subglobose, its length and breadth being nearly equal. Volutions five to six, increasing rather rapidly in size; those of the spire convex; the last one forming more than four-fifths of the entire length, and as much as nine-tenths the entire bulk of the shell,—rounded regularly from the suture above to the umbilical region below, excepting near the aperture, where it is a little more prominent below than above the middle. Suture well defined. Aperture subcircular in general outline, but rather strongly modified above the middle on the inner side, by the return of the body whorl. Inner lip slightly thickened and deeply arcuate below, but wanting or exceedingly thin above the middle of the aperture; columella tortuous, with a slightly impressed furrow at the outer margin of the inner lip, but without an umbilical perforation. Surface ornamented with regular, distinct revolving striæ, crossed just below the suture by short little regular node-like folds, confined to the narrow space between the suture and the spiral band; similar, but smaller, more crowded and longer curved wrinkles also radiate from the umbilical region, on the under side of the body whorl. Lines of growth obscure on all the specimens examined. Spiral band flattened so as to be even with the general surface, nearly smooth, and placed half-way between the middle of the body whorl and the suture above, or about once and a half its own breadth below the suture.

Length and breadth of a medium sized specimen, each 0·45 inch; length of aperture, 0·25 inch; breadth of do., 0·23 inch; apical angle convex, divergence, 90°; breadth of spiral band at the aperture 0·07 inch.

This species is nearly related to *P. Beckwithana* of McChesney (New Palæozoic fossils, p. 61), with which we supposed it to be identical from Prof. McChesney's description, until we had an opportunity to compare it with good examples of the *P. Beckwithana* from the original locality. On comparison with these, we find our shell to be readily distinguished by having its spiral band located midway between the middle and upper margin of the body whorl, instead of passing around the middle of the outer side. It likewise differs in showing no traces of revolving striæ on the spiral band, and in having small wrinkles crossing the revolving striæ on the under side of the body whorl, while the little wrinkles around the upper edge of the whorls are stronger and shorter than in *P. Beckwithana*. Again there is a difference in the revolving striæ, those of our shell never having an intermediate smaller one between two larger ones, as is generally the case with those of McChesney's species.

The close similarity between these two species, both in form and ornamentation, shows the necessity for great care and precision in drawing up descriptions of species, even where they may be widely different from all *known* forms; since we often find, in such cases, that other species are afterwards discovered that cannot be distinguished by the original description from the forms first described. Every word in Prof. McChesney's description, excepting what is said in regard to the starting point of the spiral band, would apply equally well to our species. It is true, he gives the number of whorls as four or five, while in our shell they may be described as numbering five or six, but of course little reliance can be placed upon a difference of only one whorl, where they are all counted to the extreme apex.

Locality and position.—Lower Coal Measures, on Hodge's Creek, Macoupen County, Illinois.

PLEUROTOMARIA VALVATIFORMIS, M. & W.

Shell minute, depressed, or about twice as wide as high; volutions three and a half to four, regularly rounded, and increasing rather gradually in size; suture well defined in consequence of the convexity of the whorls; umbilicus proportionally small or closed; aperture suborbicular, being a little straighter on the inner side. Spiral band nearly or quite even with the surface of the whorls, and placed on the middle of their outer side. Surface smooth, as seen without a magnifier, but presenting traces of microscopic revolving striæ, in a good light under a strong lens.

Height, 0·04 inch; breadth, 0·08 inch.

This is by far the smallest species of the genus we have ever seen, and if it were not for the fact that we find so many specimens of it not exceeding the dimensions given above, we would think might be a young shell. This, however, taken in connection with the absence, so far as yet known, of any species in our carboniferous rocks agreeing near enough for this to be its young, are sufficient reasons for believing it to be an adult shell. It is more nearly like our *P. micronema* of this paper than any of its associates with which we are acquainted, but in addition to its vastly smaller size (although having nearly the same number of whorls), it differs in being much more depressed, and in having proportionally much more slender whorls; while its spiral band passes around the middle of the body whorl, instead of between the middle and the upper margin. In the position of its band it is nearer like *P. Beckwithana* of McChesney, but differs so widely in size, and other characters, as to render a close comparison unnecessary.

Locality and position.—Hodge's Creek, Macoupen County, Ill. Lower Coal Measures.

MURCHISONIA INORNATA, M. & W.

Shell very small, conic subovate; axis imperforate; spire short (for a *Murchisonia*). Volutions six, convex, increasing rather gradually in size, last one forming more than half the entire shell, most prominent around the middle, but not even obtusely angular, a little produced below; suture impressed. Aperture slightly oblique, subovate in outline, being angular above, and rounded and apparently faintly effuse below. Spiral band not distinguishable from the general surface of the whorls, excepting from the curve of the minute lines of growth, as seen by the aid of a magnifier; apparently of moderate breadth, and placed about half-way between the middle and upper side of the body whorl, passing around near the middle of those of the spire. Surface appearing nearly smooth to the eye, but when examined with a magnifier, seen to be ornamented with small obscure revolving striæ, most distinct below the middle of the body whorl; crossing these, traces of very minute lines of growth may be seen, by the aid of a good lens in a favorable light, curving strongly backwards as they approach an undefined spiral band.

Length, 0·22 inch; breadth, 0·13 inch; apical angle about 38°.

This is one of those intermediate forms, that might, so far as can be determined from the shell, be referred with almost equal propriety to either *Murchisonia* or *Pleurotomaria*. Although we have placed it in the former genus, we are not sure but we should call it *Pleurotomaria inornata*. It will be readily distinguished from all the little species of either of these genera known to us, that have neither costate nor carinated whorls, by its nearly smooth surface and obsolete spiral band. Excepting in its much smaller size, and less produced body whorl, it has somewhat the look of *Murchisonia melanoides*, de Koninck, (An. Foss. pl. iii. sup. fig. 14, a, b,) but the more produced lower part of the body whorl of that shell gives its aperture a different form, while it has a well defined spiral band occupying a lower position on the whorls, and no traces of revolving lines.

Locality and position.—Hodge's Creek, Macoupen County, Illinois. Lower Coal Measures.

CEPHALOPODA.

NAUTILUS [TREMATODISCUS] SULCATUS, Sowerby?

Amongst other specimens from the Chester group of St. Genevieve County, Missouri, we have several examples of a small *Nautilus*, agreeing so nearly with Sowerby's *N. sulcatus* that we are strongly inclined to believe it identical with that species. It attains about the same size, has a similar umbilicus, the same number of whorls, with the same number of furrows and intermediate ridges on each side, and like that species has a small, nearly central siphon; while it also agrees in the size and flexures of its lines of growth, as well as in the variations it presents. The only differences we can see are that our shell seems to have the whorls generally more compressed, and its furrows and ridges sometimes more obsolescent on the outer volution of the larger specimens. Still it generally agrees quite as nearly with the typical forms of that species, as those usually referred to it by the most reliable European authorities, and even more nearly than many of these do with each other. (Prof. de Koninck's description of *N. sulcatus* agrees exactly with our shell.) Its lines of growth make so strong a backward curve in crossing the slightly concave, rather narrow periphery, that we were at first inclined to think it a large *Porcellia*, but a closer examination soon satisfied us that it is septate, and provided with a small, nearly central siphon. In short, it is a typical example of the group for which we proposed the subgeneric name *Trematodiscus*.

We are not aware of this species having been previously identified in America.

NAUTILUS (CRYPTOCERAS) ROCKFORDENSIS, M. & W.

As the only specimen of this shell we have seen consists of not more than half of a volution, we are left in some doubt whether it is a *Cryptoceras* or a *Gyroceras*. Its volutions were evidently not embracing, as they are not at all concave on the inner side, but rounded all around, so as to present a slightly oval, or subelliptic section, the transverse diameter of which is to the dorso-ventral, as 132 to 110. The half volution curves around an umbilical cavity apparently rather more than half as wide as the greatest dorso-ventral diameter of the volution at the same point. The siphon, although not quite in contact with the dorsal side, is so near it as to give the internal cast the appearance of having a small deep dorsal lobe. The septa are distant, measuring, on the dorsal side, about two-fifths the dorso-ventral diameter of the whorl at the point of measurement, and their edges pass almost directly around the whorls. (Surface, number of whorls and aperture unknown.)

Length of a half turn, including a small portion of the last chamber, measuring around the dorsum, 3·78 inches; greatest transverse diameter at the larger end, 1·80 inch; dorso-ventral do., 1·60 inch.

It is probable, judging from analogy, that the lip of this species, in entire specimens, will be found to be pinched out or projecting laterally on each ventro-lateral margin of the aperture, as in some other species of this type. We know of no other species with which it is liable to be confounded.

Locality and position.—Goniatite limestone, of the Kinderhook division of the Subcarboniferous series, at Rockford, Indiana.

NOTE.—In the August number of the Proceedings of the Academy for 1865, p. 165, we proposed the name *Evactinopora*, for a curious radiated body, evidently belonging to the *Polyzoa*, from the carboniferous rocks of Missouri. Since that time, farther comparisons lead us to think this fossil possibly not generically distinct from *Conodictyum* of Münster. If so, the name of our species will of course become *Conodictyum radiatum*. It is a little remarkable, however, that the known species of *Conodictyum* are from Jurassic rocks.

August 7th.

The President, DR. HAYS, in the Chair.

Fifteen members present.

August 14th.

The President, DR. HAYS, in the Chair.

Fifteen members present.

August 21st.

The President, DR. HAYS, in the Chair.

Twenty-two members present.

Prof. Cope exhibited the remains of a gigantic extinct Dinosaur, from the Cretaceous Green Sand of New Jersey. The bones were portions of the under jaw with teeth, portions of the scapular arch, including supposed clavicles; two humeri, left femur, and right tibia and fibula, with numerous

phalanges, lumbar sacral and caudal vertebræ, and numerous other elements in a fragmentary condition.

The animal was found by the workmen under direction of J. C. Voorhees, Superintendent of the West Jersey Marl Company's pits, about two miles south of Barnesboro, Gloucester Co., N. J.

The bones were taken from about twenty feet below the surface, in the top of the "chocolate" bed, which immediately underlies the green stratum which is of such value as a manure.

The discovery of this animal filled a hiatus in the Cretaceous Fauna, revealing the carnivorous enemy of the great herbivorous Hadrosaurus, as the Dinodon was related to the Trachodon of the Nebraska beds, and the Megalosaurus to the Iguanodon of the European Wealden and Oolite.

In size this creature equalled the Megalosaurus bucklandii, and with it and Dinodon, constituted the most formidable type of rapacious terrestrial vertebrata of which we have any knowledge. In its dentition and huge prehensile claws it resembled closely Megalosaurus, but the femur, resembling in its proximal regions more nearly the Iguanodon, indicated the probable existence of other equally important differences, and its pertinence to another genus. For this and the species the name of LAELAPS AQUILUNGUIS was proposed.

The following were some of the special characters.

Mandible.—Two portions, one from the anterior part of the ramus. The latter measure three inches in depth from the outer alveolar border, which is a little more elevated than the internal, and 1.5 in. in thickness at the fractured edge. A longitudinal series of vascular foramina extends along the middle of the external face. The teeth are implanted in deep alveolæ, had oval compressed fangs, and lenticular compressed crown, with large pulp cavity. The crown was elongate, subacute and slightly curved backwards, minutely striate, and strongly serrate on both edges to near the fang; this portion of a young tooth yet in the alveolus measured 2¼ in. long and 11-16ths in transverse diameter.

Left Femur.—The great external trochanter massive and elevated to the plane of the head, from which it is only separated by a slight depression, and to which it is slightly transverse. The head not projecting far beyond shaft, and without constriction below. In Megalosaurus the head is produced beyond a kind of neck, and the great trochanter is much smaller and lower down, differing thus from the other known Dinosaurs. The femur of Laelaps is therefore much flattened from before backwards above, but is cylindrical and curved backwards medially. Distally the condyles are more like Megalosaurus than Hadrosaurus or Iguanodon, yet quite different from the first. The length of the inner condyle greater than the transverse extent of the two, the popliteal groove deeper and the trochlear aspect more concave, leaving a narrower connection between the condyles. The inner condyle was much narrower and both more projecting than in Megalosaurus. The third trochanter is small, and lower down than in any known Dinosaur, being removed less than one-third the length of the femur from the inner distal condyle.

	In.
Length of femur,	31
Breadth across head and great trochanter,	6⅝
Circumference medially,	11
Antero-posterior length of inner distal condyle,	6.5
" " " outer " "	3.25
Transverse extent of united condyle,	4.5
" " popliteal groove (at middle),	1.5

Right tibia.—The tibia is more slender than that belonging to Megalosaurus described by Prof. Owen, and the distal articular surface, instead of being

lozenge-shaped, is cuneiform, the inner wide extremity oval rounded. Inner transverse breadth of proximal head one-fourth total length. Anterior ridge very strong, much incurved, disappearing at between the proximal fifth and fourth of length; internal ridge on proximal half, strong, but not reaching condyles. Posterior condyles separated by a deep notch, inner larger than outer; (outer larger, Megalosaurus b u c k l a n d i i). Shaft much compressed from before backwards, and distal articulation at right angles to proximal, concave on its interior half.

	In.
Length of tibia,	30.75
Circumference proximal head,	15.
Antero-posterior diameter do	7.5
Posterior transverse do. do	5.5
Transverse length distal condyle,	7.
Longitudinal inner breadth,	2.5
Circumference of shaft at middle,	10.5

These long bones are hollow, with thick walls of dense bone; diameter of medullary cavity at middle of tibia 1.5 inch.

Fibula.—Twenty-three inches preserved, proximally concave and dilated; condyle curved, narrow acuminate oval, in profile concave, then rounded descending; length 6 in., median breadth 1.75 in. Just below the condyle on the inside is a deep concavity with abrupt superior and lateral walls. Shaft less flattened below, but slender, reaching a width of $1\frac{1}{8}$ in.

Humerus.—Both are preserved, but lack the distal condyle; about half the olecranar fossa of one remains, furnishing an indication of the breadth of that extremity. They are proximally much dilated, having a very strong postero-external ala and a shorter antero-internal dilatation. They are not half the length of the femur; the shaft is flattened antero-internally. Of the proximal articulating surface the proper condyle is lost, but a narrow surface continuous with it externally does not extend further out on the dilation than opposite to the middle of the shaft. Olecranar fossa large and well marked, not near to penetrating; medullary cavity of shaft relatively smaller than in the bones of the leg.

	In.
Length of humerus (restored),	12
Greatest proximal breadth,	3·75
Distal breadth across olecranar fossa,	3.
Circumference of shaft,	5.$\frac{3}{8}$

These humeri are relatively shorter than in Hadrosaurus and Iguanodon, and the external alæ do not pass so abruptly into the shaft as in them.

? Clavicles.—Two lateral elements are nearly similar to those identified by Owen in Iguanodon with clavicles, and by Leidy in Hadrosaurus with the pubes. Their disproportionate size, as compared with the humeri in Laelaps, renders their recognition as clavicles difficult; they are very unlike usual forms of pubes. Each has a gentle sigmoid flexure, and a subtrigonal section They are flattened at the inner extremity and dilated with a margin at right angles to the shaft; the whole extremity is not preserved; the flattened portion is hollow, while the shaft is entirely solid. Length 18.5 inches.

Phalanges.—No. 1. An ungueal phalange of remarkable size and destructive use. The depth at the proximal articulation is about the same as in Megalosaurus b u c k l a n d i i, (two inches without inferior tuberosity) but the length is considerably greater. Form everywhere compressed, especially at tip, rounded above. Below the articulating surfaces is the point of insertion of a large flexor tendon, a flattened subglobular process, separated by a groove except in front. The groove extends on each side distally on the middle, to the tip. The general form is not unlike that of a rapacious bird, but is more compressed.

	In.
Length on convexity,	9½
Chord from articulatory surface,	6¾

Surface slightly striated at the base on one side.

No. 2. Penultimate. Proximally higher than broad, distally broader than high; two elevated articular surfaces proximally, distal condyles separated by a deep groove and much prolonged inferiorly; a fossa on each side eccentric to the condyle. Superior outline straight, inferior descending behind.

No. 3. Also penultimate, is flatter and more parallelogrammic in section than the last.

No. 4. Antepenult? more cylindrical, condyles broken.

	In.
Length, No. 2,	4.75
Proximal elevation,	1.75
" breadth below,	1.75
Breadth shank below,	1.25
Distal width,	1.25
" " of condyles below,	1.75
No. 3, proximal breadth below,	2.125
Breadth shank below,	1.50
Terminal and inferior breadth distal condyles,	1.875
No. 4. length,	6.

Vertebræ.—No cervical or dorsal vertebræ were preserved; very few lumbars, a fragment of two of the connate sacrals and numerous caudals were all as yet in Prof. C's possession. All are much constricted medially, or hourglass shaped, the centrum cylindrical in section throughout in most of the caudals, the anterior of the latter and the lumbars of deeper vertical than transverse diameter throughout. The articular surfaces were moderately shallow biconcave in all, most strongly in the subproximal caudals. The neural arches attached by permanent suture, and inferior surfaces for articulation of chevron bones. None of the caudals offer indication of elevated neural spines; they appear to have been on the majority low, and of considerable longitudinal extent. Articular surfaces for chevron bones cease near the middle of series, so that we can safely infer that the tail was cylindrical. Zygapophyses turned upward, not outward.

	In.
Length of a median caudal,	4.625
Breadth centrum,	2.375
Length base neural spine,	3.25
Length of a distal caudal (with neural canal),	2.875
Diameter centrum transverse,	1.125
" " vertical,	.875
Proximal caudal (with short diapophysis) length,	4.5
Depth centrum,	3.125
Width, "	3.
Lumbar, depth centrum,	4.5

The disproportion between the fore and hind limbs of the Iguanodon, together with the compressed form of the tail suggested to Prof. Owen an aquatic habit, a relation of proportions of limbs to habit seen in the tailless Batrachia. The discovery of the massive short-toed foot of the Iguanodon subsequently, has lent little countenance to the supposition of its entire adaptation to aquatic life. Dr. Leidy has regarded this disproportion in the case of the Hadrosaurus as an index of a habit like that of the Kangaroos (Macropus, etc.), and that that monster rested in an oblique position on the hind limbs and tail, and reached upwards with its muzzle and short fore limbs to the foliage on which it fed.

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That such a habit characterized the Laelaps is very probable; the tail was nearly cylindric, and from the extent of the condyles of the femur, the hind limb must have been considerably flexed. The small size of the fore limbs must have rendered them far less efficient as weapons than the hind feet, in an attack on such a creature as Hadrosaurus; hence perhaps the latter were preferred in inflicting fatal wounds. The exceedingly eagle-like character of the digits and claws and ornithic type of sacrum elucidated by Prof. Owen, suggest a resemblance in the use of the limb.

The bulk of the species, as compared with that of Hadrosaurus, illustrates again the law observed in the relation between Felis and Bos, Thylacoleo and the herbivorous implacentals of its time, and the other raptorial and herbivorous Dinosauria, which might probably be reduced to exact terms.

The remains indicate an animal of near 18 feet in length, which could probably raise itself to a height of six feet at the rump

To recapitulate; the genus Laelaps belongs to the family Dinodontidæ, which is characterized by its contractile raptorial claws and slender digits, and compressed sabre-shaped teeth. It differs from Megalosaurus in its femur, and from Dinodon in that teeth of the latter have two posterior serrate edges separated by a posterior plane. From supposed Dinosaurian genera of doubtful affinity, it differs e. g. from Regnosaurus *Mant.* in the totally different humerus, and from Pelorosaurus and Streptospondylus in the vertebræ. Ce tiosaurus and Cimoliasaurus were perhaps mutilate like the Cetaceans, according to Owen and Leidy.

In connection with the same fossil were found Cucullæa and Baculites sp., and not more than twenty feet off a femur of Hadrosaurus; also portions of Mosasaurus, Hyposaurus, Thoracosaurus and Bottosaurus, occurred in the neighborhood.

The phalanges figured by Prof. Leidy (Smithsonian Contributions xii.) Cretaceous Reptiles, Tab. 17, fig. 8—11, probably belong to the present species. They are included under the head of animals allied to Hadrosaurus.

In conclusion, the thanks of scientific men are due to Superintendent Voorhees for the interest and care evinced in the preservation of these valuable specimens. Were all persons engaged in digging marl equally interested in the preservation of bones which come under their notice, we might have been far nearer an elucidation of this, one of the most extraordinary faunæ which have been placed upon our planet.

August 28th.

The President, Dr. Hays, in the Chair.

Fourteen members present.

Gen. S. Wylie Crawford, M. D., U. S. A. was elected a Member.

The following paper was presented by permission, reported on favorably by the Committee appointed, and ordered to be published:

Notes on the VESPERTILIONIDÆ of Tropical America.

BY H. ALLEN, M. D.

I.

The study of the Vespertilionidæ of Tropical America has never been undertaken by any one having large collections at his command. With others, I have hitherto refrained from entering a field where such facilities, and an acquaintance with type specimens, appeared to be necessary aids to produce

results of value. In these particulars I am now no better prepared than at any other time; since but comparatively few specimens have reached me from its localities, and all its types are to be seen only in European museums. But having been compelled while studying the fauna of California to institute comparisons between some of its members and those of the Mexican provinces, to determine questions of distribution, I some time ago drew up a few descriptions of forms, which I now think are new. These, together with notes upon two bats from Aspinwall and Maracaibo, I propose to submit under provisional names. Should any or all of them prove to be old species, their descriptions can, without confusion, be appended to the original meagre diagnoses, and may thus add to what little we know of these obscure animals.

a. *Interfemoral membrane relatively small; each joint of tail a third shorter than each of β; terminal joint of tail exserted. Color of membranes and auricle blackish.*

V. MUNDUS, n. s.

Fur above long and silky, and *obscurely tri-colored; basal third mottled greyish-brown, with border toward skin whitish-grey; apical third blackish-fawn, with a tip of decided light dirty yellowish-brown. This tip hue is more marked toward coccyx, and everywhere mingles with the blackish-fawn*, so that the prevailing color is seen to be mottled brown fawn, flecked with the lighter shade just mentioned. Beneath *fur more bi-colored*, base being blackish, with a faint white line at root; *tip being pale grey, verging to a whiter shade at pubis, where it is almost uni-colored. The fur here also extends in a sparse degree nearly to the region of the elbow.* Head less clothed than the other species. Base of foot claws sparsely furnished with glistening brown hair. Auricle upright, narrow; tragus subulate. External basal lobe of ear obscurely quadrate, rolled inward at upper free border; tip of auricle bluntish; external border very slightly emarginate. Phalangeal callosity prominent, brownish. Wing membrane to base of phalanges of toes; *small whitish tubercle at fibular side of ancle;* membrane over calcareum also whitish. Membrane very small; interfemoral membrane triangular; *joints to the tail nine, the last free;* nostrils oblique, palmate; lower border thin, upper border swollen. *Teeth.*—Central incisors placed obliquely to the dental arch, bicuspid, internal the larger; lateral placed at right angles to dental arch; cusps of equal length; *molars* $\frac{5}{6}$, *most probably in adult* $\frac{6}{6}$. *Inferior incisors overlapping; lateral incisors quadrilobed.*

Measurements.

Length of head 6‴	Length of foot 3‴
" " body 11‴	Height of auricle 5‴
" " tail 1‴·1‴	" " tragus 3‴
" " humerus 1‴·2‴	2d joint index finger $\frac{1}{16}$″
" " thumb 2½‴	Expanse 6‴·6‴

Young ♀, No. 5547, Museum of Smithsonian Institution. Alcohol. Maracaibo, Ven.

V. CONCINNUS, n. s.

Fur above silky; prevailing hue *obscure chestnut-fawn.* Indistinctly *bi-colored, basal half being brownish-black.* Upper portion of interfemoral membrane sparsely covered with fur of the same color. Beneath *fur more distinctly bi-colored, the basal half or two-thirds being as above; apical portion, however, being light greyish-brown, verging to yellow toward region of pubis and russet about the neck.* Head woolly, of nearly the same color as the fur of the back, somewhat lighter, and in one specimen nearly unicolored. The basal third of posterior surface of auricles furnished with unicolored light greyish-brown hair. Upper lip very faintly whiskered. Auricle erect, bluntish at tip; internal basal lobe acute, less so, however, than *V. subulatus.* External border very faintly scooped out; external basal obscure, turned inward at upper border;

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tragus subulate, basal cusp turned forward; nostrils palmate, inferior border not well defined nor much swollen above; lower lip not free. Membrane to base of toes; tubercle at base of fibula very faint, as the calcaneum is slightly developed. Membrane over both of the same color as that elsewhere; *joints of tail ten, terminal one half exsert. Teeth.*—Central incisor in line of arch, the medial cusp the larger; lateral more at right angles to arch; posterior cusp much smaller than anterior; palatal ridge absent; first and second premolars subequal, the first being slightly the larger, and both thrown slightly inward from dental arch; molars, $\frac{6}{6}$. *Inferior lateral incisors quadri-lobed.*

Measurements.

Head 7‴	Foot 3‴
Body 11‴	Auricle 6‴
Tail 1″.4‴	Tragus 5‴
Humerus 1″·4‴	Length 2d joint index finger 2‴
Thumb $2\frac{1}{2}$‴	Expanse 9″

Two individuals. Nos. 1114, 1115, Mus. of Academy. Alcohol. San Salvador.

V. EXIGUUS, n. s.

Fur above basal three-fourths blackish; apical fourth grey. Toward the coccyx the basal hue is more brownish, the tip glistening brown. Basal third of upper surface of inter-femoral membrane covered with a thin patch of nearly unicolored glistening hair. Beneath fur more tri-colored; thin line of whitish hairs at base; distal two-thirds blackish-fawn, apical third greyish. Toward the pubis hair almost white, mixed with dirty yellow, and the membranes to near elbow and basal third of interfemoral membrane possess a scattering pelage of the same hue. Tip of auricle bluntish, internal basal acute, *external basal well marked, broadly crescentic;* tragus narrow, acuminate, emarginate on the upper two-thirds; nostrils with a well-defined lower edge, palmate (as in 5547); membrane to base of toes; joints of tail nine; scarcely any ex-calcaneal lobe; calcaneum slender. Teeth as in *V. mundus.* Individual young, and the second premolar above is not yet fully erupted. Lateral incisors below obscurely quadrilobed.

Measurements.

Length of head 7‴	Length of foot 4‴
" " body 1‴	" " auricle 6‴
" " tail 1″·2‴	" " tragus 3‴
" " humerus 1″·4‴	" " 2d joint index finger 2‴
" " thumb 3‴	Expanse 8″

One individual, ♀. No. 5373, Mus. of the Smithsonian Institution. Alcohol. Aspinwall, N. G. Dr. Hayer.

V. OBSCURUS, n. s. (No. 8223 type.)

Fur above dark plumbeous at basal two-thirds; woolly texture and obscure fawn-brown at apical one-third. Below basal two-thirds blackish, apical one-third yellowish-white; more russet under jaws; face very hairy; membranes furred; lateral lower incisor square quadrilobed, raised considerably above level of other teeth; upper premolars in line, first little longer; lower premolars same; interfemoral membrane triangular; joints of tail nine, terminal joint conspicuously exsert. Ear, external basal lobe irregularly quadrate; other parts as other species of N. A. *Vespertilio.* Nostrils with lower border everted, not elliptical.

Mutilated.

(8222.) Fur above basal two-thirds dark brownish-black, streaked with bright olive-brown hairs at base; apical one-third glistening olive-brown below; basal four-fifths brownish-black, streaked with yellowish hairs at

base; apical third brownish-grey at neck, lighter at pubis; teeth as 8223,—also ear and membranes; joints of tail ten; in both feet and thumb large, but specimens young.

Measurements.

Length of head 7‴	Length of foot 4‴
" " body 1″	Heighth of auricle 5‴
" " tail 1″·3‴	" " tragus 3½‴
" " humerus 1″·4‴	Length of 2d joint index finger ½‴
" " thumb 3‴	Expanse 8″·2‴

Two young individuals, ♂. Nos. 8222, 8223, Mus. of Smithsonian Institution. Alcohol.

Lower California. John Xantus.

Also young individual mentioned in Mon. (loc. cit.) as a variety of *V. nitidus* (*V. Oregonensis*). It very closely resembles sp. 8222. Dry. No locality.

β. *Interfemoral membrane relatively large; each joint of tail a third longer than each of α; terminal joint not exserted, (a small tip of cartilage may be exserted;) color of membranes and ear light brown, excepting* V. exilus.

V. AGILIS, n. s.

Fur silky, above of a very dark plumbeous verging to black, with apical fourth of a decided dark brown; on back, running to a lighter shade on head, where the fur has a more woolly texture. Fur wanting from region of loin and interfemoral membrane. Beneath, the base of the fur the same as above, apical fourth being of a lighter brownish grey; basal third posterior surface of auricles being clothed with a few sparse unicolored greyish hairs. Auricle almost bluntish at tip, internal basal lobe sharply pointed; tragus acuminate, broad at basal third; external basal lobe prominent, free, broadly crescentic; joints of tail nine, enclosed in interfemoral membrane; nostrils mutilated, oblique, probably palmate.

Measurements.

Length of head 7‴	Length of foot 3‴
" body 1″	" auricle 7‴
" tail 1″·6‴	" tragus 3½‴
" humerus 1″·4‴	" 2d joint index finger 1‴
" thumb 2¼‴	Expanse 9″

One individual ♀. No. ? Mus. of Smithsonian Institution. Alcohol. Dr. Sartorius. Mirador, Mexico.

V. VOLANS, n. s.

Fur: above dark plumbeous at basal third; apical third obscure, light brown, scarcely any extension on membranes; basal third interfemoral membrane same. Below, basal two-thirds plumbeous, shade lighter than above; apical third a light-brownish fawn. Moderate extension of hairs upon membranes to near elbow, and upon basal third interfemoral membrane. Auricle slightly "scooped out;" external basal lobe salient, quadrate; tragal lobe very salient; nostrils elliptical; index finger strong, membrane uniting it with middle finger, ample; joints of tail nine; tip barely exserted; excalcaneal lobe conspicuous; upper incisors as usual; lower external scarcely if at all quadrilobed; first and second upper premolars placed a little within line of arch. Skull: upper border anterior nares semicircular; facial bones abbreviated, causing the brain case to appear greatly inflated.

Measurements.

Length of head 6‴	Length of foot 3¼‴
" body 1″	Height of auricle 5‴
" tail 1″·9‴	" tragus 3‴
" humerus 1″·5‴	Length of 2d joint index finger 1‴
" thumb 3‴	Expanse 9″

One individual ♀. No. 5398 Mus. Smithsonian Institution. Alcohol. Cape St. Lucas, Lower Cal. John Xantus.

V. EXILIS, n. s.

Fur: above, long, rich plumbeous two-thirds; apical third pale russet yellow; head and face surmounted with same; conspicuous patch at basal half interfemoral membrane. Venter same proportionate base of black; apical third paler yellow, running to white toward pubis; small patch of same colored fur at base of interfemoral in front; sparse hair runs on membrane up to elbow; thick labial fringe of dark brown hair running downward to below level of lower jaw. Orbital wart also covered with prominent clump of hair of same color. Auricle black; external border slightly emarginate; internal basal acute; external basal prominent, equal sided; tragal lobe salient; nostrils scarcely elliptical; inferior border everted; lateral incisors unicuspid; placed to central, as in other species; inferior incisors increasing in thickness toward canines, lateral, most being obscurely quadrilobed (as in other species;) joints of tail nine, long, tip scarcely exsert.

Measurements.

Length of head	6‴	Length of foot	3‴
" body	1″	Height of auricle	6‴
" tail	1″·6‴	" tragus	3¼‴
" humerus	1″·4‴	Length of 2d joint index finger	1½‴
" thumb	2½‴	Expanse	7½″

One individual ♂. No. 5402 Mus. Smithsonian Institution. Alcohol. Cape St. Lucas. John Xantus.

V. TENUIDORSALIS, n. s.

Fur very imperfect. Above, blackish basal two-thirds; dark brown apical third; below blacker basal two-thirds; reddish brown apical third; (belly and membranes denuded.) Auricle and tragus as *V. exilis*. Nostrils very elliptical; thumb and foot barely large; joint of tail nine; tip not exsert.

Measurements.

Length of head	6½‴	Length of foot	2½‴
" body	11‴	" auricle	5‴
" tail	1″·3‴	" tragus	3‴
" humerus	1″·3‴	" 2d joint index finger	1‴
" thumb	2‴	Expanse	7″·10‴

One individual ♀. No. 5533 Mus. Smithsonian Institution. Alcohol. Cape St. Lucas, Lower Cal. John Xantus.

V. YUMANENSIS.

Auricle and tragus as 5402; external basal lobe quadrangular; pale brown nostrils. Sides of face swollen; joints of tail eight; tip not exsert. Fur: Above, long, silky, basal two-thirds and black; apical third pale russet yellow, extending on to membrane from body one-third the distance to elbow. A small patch of pale yellow hairs at basal half of interfemoral membrane. Below, black at basal half, dirty white apical half; extending on membrane nearly to elbow; patch on interfemoral of smaller size than that above. Labial fringe thick, extending to below lower jaw. Warts also surmounted with a prominent clump of hairs of a darker color.

Measurements.

Length of head	7‴	Length of foot	2‴
" body	9‴	Height of auricle	6‴
" tail	1″·4‴	" tragus	4‴
" humerus	1″·3‴	Length of 2d joint index finger	
" thumb	2¼‴	Expanse	9″·4‴

One individual, young ♀. No. 5537 Mus. Smithsonian Institution. Alcohol. Fort Yuma. Maj. Gen. G. H. Thomas, U. S. A.*

This last group includes those given in my monograph as varieties of *V. nitidus*, where I proposed that the name *V. oregonensis*, which was attached to one of the specimens, should be retained, in the event of their proving to be distinct. Now that it appears probable that there is a group of closely allied species of Vespertilionidæ inhabiting the southwestern portions of the United States and Mexico, of which *V. nitidus* is a member, I have concluded to place the so-called *V. oregonensis* under one of this group, *V. obscurus*, and give, provisionally, new names to the others. "*V. oregonensis*" bears no locality. As regards the distinctions between the above specimens and *V. nitidus*, it will be seen that the prevailing deep-plumbeous basal half of the fur *above*, with its rich chesnut, olive brown, or, in some specimens from New Mexico, a sandy-chesnut tip, and the lighter shades of the same colors to the fur *beneath*, sufficiently serve. The superior border of anterior nares is semicircular; the 2d premolar of upper jaw wedged in between 1st and 3d to a degree preventing it from being visible in profile from buccal side.

A revised description of *V. yumanensis* is also given, to correct some errors in the original notice. The representation of the tail and interfemoral mem-

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*Compare the above descriptions with V. HYPOTHRIX, D'Orb.—Smoky brown, deeper above than below, where the fur is mixed with grey. *Hab.*—Moros, Bolivia.

V. ISIDORI, D'Orb.—Glazed greyish fawn at tip of fur above, brownish black at base. The brown is more marked on shoulders and back of neck. The head is also browner than that of the back and loins, but less than that of the shoulders; the cheeks and parts beneath neck passing to brownish cinnamon. Belly is dirty grey, with base brownish black. *Hab.*—Corrientes, S. A.

V. BRASILIENSIS, Spix.—Size of *V. subulatus*. Black. Tail exsert. *Hab.*—Brazil.

V. MEXICANUS, De Sauss.—*Gilt brown*, with *brown* at base; beneath grey or pale, with blackish base; eleven joints to tail. *Hab.*—Mexico.

The following is drawn up from personal examination of four dried specimens collected by Mr. Sumichrast at Orizaba, Mexico.

Fur: Above, long, silky, plumbeous or deep blue slate at basal two-thirds, with obscure chestnut or dark brown at apical third; a very small patch of fur on interfemoral membrane; none on wing membranes.

Beneath, fur short, thickly set; basal three-fourths dark plumbeous; apical fourth uniform grey or dirty yellowish brown.

The skull is slightly crested at venter; proportions larger than other American species of Vespertilio.

V. CHILOENSIS, Waterhouse.—*Reddish black*. More or less greyish on belly, (Castelnau:) rich brown, (Waterhouse.) Upper incisors nearly subequal; outer side of tragus obscurely crenated. *Hab.*—Chiloe Islands, and extending upwards in Brazil (?).

V. CINNAMON, Gervais.—*Reddish-cinnamon*, deeper above than below; tragus curvilinear at lower part of outer border. *Hab.*—Capellanova, S. A.

V. ARGINOS, Temm.—Fur short; above black; beneath, blackish brown; points of hair "fallow;" whitish at region of coccyx, so as to form here a whitish margin. No emargination on outer border of ear. *Hab.*—Surinam.

V. ALBESCENS, Geof.—Upper parts black, portion tipped with greyish in part. Inferior parts black, tipped with whitish towards the pubis and coccyx. Hair above entirely blackish, not greyish or fawn tip. *Hab.*—South America.

V. LACTEUS, Temm.—Blackish brown at base above; reddish brown at base beneath; tip whitish both above and beneath. *Hab.*—North America (?).

V. PARVULUS, Temm.—Prevailing tint black, with isabel tint on thighs. *Hab.*—Brazil.

V. POLYTHRIX, Isid.—Deep brown, *chestnut above*; lighter, and marked with greyish below. *Hab.*—Brazil.

V. LARVIS, Isid.—Marked as *polythrix*, but has remarkable proportionate development of wing membranes. *Hab.*—Brazil.

V. MONTANUS, Philippi and Landbeck.—Ears ample, oblong; tragus straight; tail truncated; above mouse color, beneath greyish white; face above black. Stands between *velatus* and *chiloensis* *Hab.* Cordilleras at Santiago, 7000 feet above the sea.

brane in the Memoir, *loc. cit.*, is taken from a young specimen; and the account is otherwise too meagre. It is unfortunate that the original specimens of this bat, recorded in the Memoir, are unavailable for comparison. They were mislaid during the fire at the Smithsonian Institution in January, 1865, and have not since been found.

II.

RHOGEËSSA, n. g.

Skull.—Depressed, not crested; occiput triangular, slightly swollen, supra-occipital process subtrenchant. Nasal bones slightly decurved, in median line forming a conspicuous linear fossa running to the nares; superior border of anterior nares rounded, not reaching line of infra-orbital foramen above; on palatal surface terminating on a line with the premolar. Orbital processes but slightly swollen, lower than base of nasal bones. Sides of face between these points concave, groove-like. Inner wall orbital space acutely convex, incurved markedly at base. Infra-orbital ridge defining foramen behind; foramen on a line with first true molar; cochleæ not visible; intermaxillaries rudimentary; lower jaw ramal angle rather broad, turned outward from angle.

Dental formula—

$$\frac{\text{m.}}{\frac{4}{5}} - \frac{\text{c.}}{\frac{1}{1}} - \frac{\text{i.}}{\frac{1}{3}} \text{ —— } \frac{\text{i.}}{\frac{1}{3}} - \frac{\text{c.}}{\frac{1}{1}} - \frac{\text{m.}}{\frac{4}{5}} = 30$$

Molars as in *Nycticejus;* lower premolars closely approximated; canines above with a groove on palatal face deeper inferiorly, terminated by a cingulum; lower cingulum marked; incisors above close to canines, slender, convergent, unequally bifid at tip; inner cusp the longer. Below, terminal tooth on either side unicuspid; remainder tricuspid; external cusp inconspicuous. Ear tapering, erect, disjointed, nearly as long as head; internal basal lobe rounded; external basal almost null; border inverted. Tragus erect, subulate, half height of ear, straight on inner, divergent on outer border; basal lobe comparatively small. Snout obliquely truncate or slightly tumid; nostrils circular, well defined, terminal, separated by a slightly scalloped space. Mental plate obscurely triangular; distal joint of thumb free; wing membrane to base of toes; ex-calcaneal lobe present; joints of tail eight, included in a nearly naked triangular inter-femoral membrane.*

R. PARVULA, n. s. (No. 7841 type.)

Ear sub-acute at tip; lips whiskered; eyes very small, each furnished with a wart above; similar growth seen beneath chin. Fur above silky, not thick, of a light greyish-brown at basal third, fawn-chestnut-brown at apical two-thirds; that of head same color, running on to the ears one-half their height. Beneath, basal third inclined to greyish; apical two-thirds greyish-fawn. Membranes almost black, naked, excepting basal fourth of interfemoral membrane behind, which is furnished with a small, short patch of glistening fur.

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*Compare

NYCTICEJUS (*N. crepuscularis*).

Skull slightly depressed at vertex; occiput obtusely triangular, entire, not swollen; nasal bones flat, with a small shallow median fossa, not running to nares, which are irregularly rounded at upper border, extending to level of infraorbital foramen; on palatal surface broad, running to level of premolar. Orbital processes acutely edged, inner wall orbit nearly flat. Infra-orbital ridge and foramen as in *Rhogeessa*, but no oblique groove on sides of face. Cochleæ not visible. Lower incisors all equally trifid; upper incisors unicuspid.

NYCTINOMUS (*N. nasutus*).

Skull much depressed at vertex. Occiput not completely defined, rounded, and swollen at supra-occipital region. Nasal bones flat, scarcely decurved, a small fossa seen at their base, and convex at nares. Contour of anterior nares above obscurely tri-foil like, extending to level of infra-orbital foramen, small on palatal surface running to level canine tooth. Orbital process swollen, posteriorly produced in front. Infra-orbital foramen at posterior third of orbito-nasal space. Inner wall orbital space flat. Cochleæ not visible. Upper incisors unicuspid; lower centrals bifid; laterals unicuspid.

Measurements—7841.

Height of auricle 6″	Length of longest finger 1′·11″
" tragus 3″	" thumb 2″
Length of head 7″	" tibia 5″
" body 10″	" foot 2½″
" tail 1′· 2′	Expanse 6′· 7″
" forearm 1′ 1″	

Two individuals, ♂ and ♀. Nos. 7841, 7842, Museum of Smithsonian Institution. Alcohol.

Tres Marias, Mexico. Col. Grayson.

R. TUMIDA, n. s.

Fur above bi-colored; basal two-thirds pale yellow, apical third dark fawn, less distinctly bi-colored towards loins, where it becomes woolly. Beneath as above, fawnish toward the sides. Specimen deficient in fur at loins and wing membranes. It is probable that the membranes at base of tail and sides of body were clothed with fur. Snout tumid, not truncate; nostrils circular; sides of face enlarged by large oblong swellings; wart above eye, none under chin; lower lip tumid, free from gum; lips not whiskered. Skull with nasal groove less expressed, inner wall orbit less convex than *N. parvulus*; side of face over infra-orbital foramen slightly swollen. Dentition as in preceding species; superior incisors not bifid—points probably worn off.

Measurements.

Height of auricle 6″	Length of longest finger 2″. 3‴
" tragus 3½″	" thumb 2½″
" head 7″	" tibia 5″
" body 12″	" foot 2½″
Length of tail 1″	Expanse 10· 3″
" fore arm 1· 2″	

One individual, ♂. No. 8195, Mus. of Smithsonian Institution. Alcohol.

Mirador, Mexico. Dr. Sartorius.

This genus appears to connect the Noctilionidæ with the present family: with the former through *Nyctinomus*, with the latter through *Nycticejus*. The circular nostrils, sub-truncate snout, the detail of inferior incisors, the angle of lower jaw—to Noctilionidæ; the tapering face, marked median groove, tapering tragus and pointed ear, number and general arrangement of teeth, extent of hard palate, length of tail and attachment of wing membranes,—to Vespertilionidæ.*

It reminds one of *Nycticejus* and *Lasiurus* in the slightly tumid face (this is more marked in *R. tumida*) and the dentition; while the shape and relative length of the auricle and tragus, and the decurvation of nasal bones, recall *Vespertilio*.

* The value of the presence of one or more phalanges to the index finger, in the classification of this group, is not yet determined; so the fact that this finger in *Rhogeessa* is made up of two phalanges has not been made a feature of the diagnosis. My attention has been recently directed to this subject by remarks made by Prof. Peters (Monatsbericht. der Königl. Acad. der Wissenschaft, Berlin, Oct., 1865), in his paper on the true position of *Antrozous*,—who, by the presence of two phalanges to the index finger of *Antrozous*, would remove it from the position I assigned it—the Vespertilionidæ—to the Megadermatidæ; placing it in proximity with *Nyctophilus*. But so far as I have observed, the distal end of the first phalanx is *always abrupt*; the interval between it and the contour of second finger is membranous in *Nyctinomus*, but partially ossified, forming thus a second phalanx in *Lasiurus*, *Antrozous*, *Vespertilio*, *Scotophilus*, and *Nycticejus*. I am not acquainted with *Nyctophilus*, but in *Megaderma lyra* the second joint is relatively no larger than in *Lasiurus* or *Scotophilus*, while it is more marked than it is in *Antrozous*. From reading Mr. Tome's description of *Nyctophilus* (Proc. Zool. Soc., 1858, 25), I would, with Prof. Peters, approximate it to *Antrozous*, but would agree with Mr. Tomes in considering *Nyctophilus* and its congeners as members of Vespertilionidæ. A second phalanx exists in my new genus, while no such phalanx is seen in *Nyctinomus*. So it would appear, in absence of the observation that the uni-phalangeal index finger is not common to Noctilionidæ, that *Rhogeessa*, is nearer *Nycticejus* than *Nyctinomus*.

III.

In determining the species of *Scotophilus* of North America, I had been influenced by the authority of Major John Le Conte (Mon. on N. A. Bats) to consider *S. carolinensis* as distinct from *S. fuscus*, although suggesting at the time that they might prove to be identical. I now venture to consider them such, and make the former a synonym to the latter. This has not been done hastily. It is not to be presumed that all the specimens of *S. fuscus* found in this country are identical in every particular. They arrange themselves in groups, of just sufficient definition to mislead the observer. But it is found, upon careful comparison, that so vaguely are the boundaries of these groups determined, that it is impossible to assign them precise limits. Among the characters selected for this purpose, successively embraced and relinquished (apart from the coloration of fur elsewhere noticed), are the infra-orbital foramen, whether it be well defined in front or open; the zygomatic arch, whether straight on inferior border and forming a right angle with the tuberosity of superior maxilla, or curved on inferior border, and forming an obtuse angle; the inner side of orbital space, whether flat or convex; the glenoid cavity, whether transversely elliptical or lozenge-shaped; the tragus, whether incurved at tip or straight; the outer border of ear, whether emarginated or nearly entire; the nostrils, whether palmate or reniform; and the proportionate size of the foot and thumb. But it does not follow after all that I am correct in this conclusion. A more acute observer than myself may yet divide *S. fuscus* into several species.*

The extent of the ex-limital distribution of this species is not yet determined. M. Gervais thinks it probable—and the extended study he has given this group renders his opinion valuable—that *S. dutertreus* is identical with "carolinensis," and that both *S. innoxius* and *S. furinalis* may be found in North America. I have seen several specimens of *S. fuscus* from Mexico which present no differences from those met with in the United States.

Another specimen, however, from Mirador, Mexico, has peculiar coloration, and may receive the following description:

S. MIRADORENSIS, n. s.

Head and auricle much as in *S. fuscus*. *Inner border auricle inclined, obliquely rounded; inner edge free; anterior border nearly covering eye;* tip rounded, turned very slightly outward; outer border scarcely if at all scooped out; basal third moderately revolute. *External basal lobe oblong and crescentic, not markedly turned inwards; as long as interval between it and angle of mouth.* Tragus erect, nearly half as high as ear, straight on inner border, tip not incurved; outer border divergent, slightly convex; basal lobe obtusely rectangular, turned somewhat forward. Nostrils sub-reniform; *posterior angle well defined;* space between nostrils as usual, naked, concave. Mental space illy defined. The supra-orbital and gular warts as usual. Membranes light brown, attached to base of toes; phalangeal callosity of thumb marked; tubercle present on tibial side of foot; a larger one on fibular side for membranous calcaneum. *Joints of tail nine; terminal and half penultimate free.* Inter femoral

* The following is a list of the smaller species of Scotophilus of Europe in the collection of the Academy:

1144.	Scotoph.	pipistrellus,	Italy,	Bon. Coll.	Dr. T. B.	Wilson.
509.	"	pipistrellus,	"	"	"	"
1155.	"	alcythoe,	"	"	"	"
1182.	"	Bonapartii,	"	"	"	"
1138.	"	"	"	"	"	"
516.	"	leucippe,	"	"	"	"
704.	"	albolimbatus,	"	"	"	"

It is not improbable that specimen No. 516 is the type of *S. leucippe*. This specimen appears to be almost identical with 509, *S. pipistrelius*. The prevailing hue of all the above South European species, excluding *alcythoe*, is a rich chestnut-brown fur above, with the apical one-fifth of a gilt yellowish-brown. Beneath fawn-brown at basal two-thirds; whitish at apical third.

membrane triangular; ex-calcaneal lobe commencing 2‴ from ancle, abruptly crescentic. *Fur nearly unicolor, everywhere long and silky; above of a lustrous yellowish fawn-brown, somewhat lighter at base. Below same prevailing hue, a shade or so paler. Head and base of ears covered as usual. Scarcely any extension upon the membranes, an extremely small patch alone being seen at the base of the dorsum of inter-femoral membrane.*

Measurements.

Length of head	11‴	Length of foot	5‴
" body	1″·6‴	Height of auricle	7‴
" tail	2″·3‴	" tragus	4‴
" humerus	2″	Length of 2d joint index finger	2‴
" thumb	4‴	Expanse	13″·6‴

One individual, ♀, Mus. of Smithsonian Institution. Alcohol. Mirador, Mexico. Dr. Sartorius.

IV.

A small collection of bats made by Dr. E. Coues, U.S.A., in 1864 and 1865, was found to be comprised as follows:

7802.	V. subulatus,	Fort Whipple.		Smithsonian Institution.		Dry.
7803.	"	"	"	"	"	"
7804.	"	"	"	"	"	"

The only peculiarity in these specimens is a more extensive distribution of the fur over the dorsal surface of the interfemoral membrane than is seen in the more eastern specimens.

The fourth specimen was an imperfect skin. The proportions of the face distorted, the wings broken, and the vertebra of the tail removed. Enough remained, however, to detect marked differences between it and the others, warranting, it is thought, a distinctive name.

V. MACROPUS, n. s. prov.

Above, fur long, silky, basal three-fourths black, apical fourth uniform light russet brown; a small clump at base of inter-femoral membrane. Beneath, same proportions as above, being at base black, at tip greyish-white, pure white at pubis; fur extends laterally on membrane midway to elbow. *Wing membrane attached midway between base of outer toe and ancle joint.* In other respects it closely resembles *V. subulatus*.

Measurements.

Height of ear	6‴	Length of foot	4½‴
" tragus	3½‴	" 2d joint index finger	1‴
Length of humerus	1″·4‴	Expanse	8″·3″
" thumb	3‴		

Mature. Dr. Coues' Private Collection.
Near Fort Majaor, Colorado River, New Mexico. Dr. E. Coues, U.S.A.

Other bats so far met with in New Mexico are *Lasiurus cinereus*, *V. evotis*, *V. lucifugus*, *V. nitidus*, *Corynorhinus macrotis*, *Antrozous pallidus*.

[Aug.

September 4th.

Prof. CARSON in the Chair.

Thirteen members present.

September 11th.

MR. CASSIN, Vice-President, in the Chair.

Twenty members present.

Mr. Thomas Meehan remarked :

I present to the Academy specimens of *Pinus pungens*, Michaux, gathered by me on the east side of the Schuylkill River, in the Blue Mountain Ridge, near Hamburg, in Berks County, about 75 miles from Philadelphia by the Reading Railroad.

The greater part of the Pine here is of *Pinus inops*, with a few of *P. rigida*. The *P. pungens* is scattered here and there amongst them. Further up towards Port Clinton I saw it in comparatively large quantity, and on the opposite or west side of the River, so far as I could judge by the appearance of the wood, it seemed very abundant.

The discovery east of the Susquehanna is interesting from its formerly supposed limited location on Table Mountain, North Carolina, by Michaux. Mr. Loudon subsequently noticed its discovery in the Blue Ridge, in Virginia, and more recently Prof. Porter, as recorded in the Proceedings of this Institution, discovered it sparingly in the Alleghanies, near Huntingdon.

A very old collecter of plants, whom I accidentally met some few years ago at Allentown, assured me that he had seen specimens many years past in the Blue Mountains, near there, but I supposed at that time he was probably mistaken. Its discovery now in the same ridge, leads to the probability that it is by no means a local species, but may most likely be found scattered along the mountain slopes from North Carolina to the Delaware.

In favorable situations it would probably become a larger tree than *Pinus inops*. I measured one standing by the road side that was 5 feet in circumference, about four feet from the ground. The tree was apparently 50 feet high.

Dr. Leidy exhibited specimens of a large Coccus on the Black Oak, Quercus tinctoria.

Mr. Cassin remarked that the *Crotophaga ani*, from Edenton, N. C., presented this evening by Dr W. A. B. Norcom, though a common West Indian bird, was the third specimen, of which he had any knowledge, that had been procured in the United States.

September 18th.

MR. VAUX, Vice-President, in the Chair.

Twenty-two members present.

The death was announced of Dr. A. A. Gould, of Boston, a correspondent of the Academy.

September 25th.

The President, DR. HAYS, in the Chair.

Twenty members present.

Dr. E. B. Vandyke, and Mr. Frank H. Wyeth were elected members, and Mr. Gabriel Manigault, of Charleston, S. C., was elected a correspondent.

October 2d.

The President, DR. HAYS, in the Chair.

Twenty-eight members present.

The following were offered for publication:

"On the Period and Ratio of the Annual Increase in the Circumference of Trees." By Thomas Meehan.

"Third Contribution to the History of the Balaenidæ and Delphinidæ." By E. D. Cope.

October 9th.

The President, DR. HAYS, in the Chair.

Twenty-two members present.

October 16th.

The President, DR. HAYS, in the Chair.

Twenty-eight members present.

The following was offered for publication: "Synopsis of the Batrachia and Reptilia of Arizona." By Ed. D. Cope.

Dr. Slack exhibited some living specimens of Menopoma, from the upper Alleghany River, and remarked that in the summer they appear of a light slate color; in the winter, dark brown.

October 23d.

The President, DR. HAYS, in the Chair.

Thirty members present.

Dr. Leidy exhibited a tusk, fragments of others, and molar teeth of Mastodon ohioticus from Big-bone-lick, Kentucky, belonging to the Museum. The specimens exhibited a remarkable degree of attrition, in various positions, which he supposed to be due to their having been ground in and by moving masses of ice.

Mr. Cope made a communication in regard to the Mesozoic Sandstone of Pennsylvania, expressing the probability of its horizon being that of the Trias of Europe, on account of some contained vertebrate remains which he had previously described, and also from some bones of a Pterodactyle now in his possession, for which he proposed the name of *P. longispinis*.

Mr. Cassin made some remarks in regard to the existence of deposits in the vicinity of Atlantic City, N. J., analogous to the Kitchen Middens of Northern Europe and similar to those noticed by Dr. Leidy, near Cape Henlopen, Del.

Mr. Ennis reported the existence of a similar shell bed near Cape May Court House, N. J.

Dr. Leidy observed that during the past summer he had made another visit to the Kitchen Middens of Cape Henlopen, in company with Mr. Cassin, Mr. Robert Frazer, and Mr. Canby of Wilmington. They had noticed the shell

accumulations extending from just below the town of Lewes on Delaware Bay, for about the distance of a mile or more to the base of a huge sand dune between the bay shore and the light-house of Cape Henlopen. They had provided themselves with ample means to examine the extent of the shell heaps, and had been surprised to find that they were all quite superficial, from a few inches to less than a foot in depth. In a number of places they appeared to form hillocks, but they were only accumulations around the former sites of trees, as indicated by the traces of stumps and roots.

They visited similar accumulations on the shore south of the Cape, and were told that they were found in many positions down the coast.

All of those which were examined contained fragments of pottery, chips of jasper, and stone arrow-heads. A few copper rings were also found, and in one heap Mr. Canby found several English coins.

Dr. Leidy thought the shell-heaps were of no great age, and were probably cotemporary with the discovery of the country by Europeans.

October 30th.

MR. VAUX, Vice-President, in the Chair.

Twenty-six members present.

Drs. William Mayburry, and W. C. Dixon were elected members.

Dr. Hayden, having just returned from a tour of exploration to the "Mauvaises Terres," or "Bad Lands" of White River, made some remarks in regard to a side trip to the celebrated Pipestone quarry of North-eastern Dakota. He spoke of the locality as very inconspicuous, and that it would have hardly attracted attention had the existence of this Pipestone bed not been known to exist there. Not a tree is to be seen in the region round about, only a few small bushes growing among the rocks. There is an escarpment, or nearly vertical wall, extending across the valley of Pipestone creek nearly a quarter of a mile either end of this wall, gradually passing from view beneath the prairie. The entire thickness of the rocks is about 50 feet. The Pipestone layer is about 11 inches in thickness; about 2½ inches is homogenous and compact enough to be used by the Indians for the manufacture of Pipes. The remainder is of various colors and texture, from a deep red to a cream, and oftentimes mottled. The rock is soft, slaty, fragile, and underneath the Pipestone is a bed of close-grained grey quartzite; above there is about 6 feet of the same rock, which must be removed with great labor before the precious material can be secured. Still higher are 40 or 50 feet of reddish and variegated quartzites, which, like the pipestone itself, are colored with peroxide of iron.

It is difficult to come to any positive conclusion as to the age of these rocks, from the fact that no well defined organic remains could be found. It is the opinion of the eminent geologist, Prof. Hall, that they belong to the Huronian series, and, from his large experience among those rocks, and the fact also that he describes similar quartzites at a point within 60 or 70 miles of the quarry, entitles his opinion to great weight. Rocks of the same age occur at Sioux Falls, and upon the smooth surfaces may be seen, in great numbers, the outlines of what appear to be bivalve shells, but so close grained is the quartzose matrix that no well-defined shell could be broken from it. If these rocks are really charged with fossils, we are led to look higher in the geological scale for the true age of the Pipestone bed.

Dr. H. remarked, in regard to the time of the opening of this quarry by the Indians, he does not think they had any knowledge of the rock far back in the past. No trace of stone implements were discovered in the vicinity, and he could not ascertain that any had ever been found. Mr. Vaux, Vice-President of the Academy, has examined large collections of stone implements and orna-

ments from ancient Indian mounds, without ever seeing any made of the pipe-stone. Acting on this suggestion, Dr. H. examined such works as were within his reach, and he could not ascertain that the numerous and careful explorations of the mounds in the Mississippi Valley have as yet revealed any ornaments made from this rock. The Indians must therefore have discovered the quarry since the stone age.

Dr. H. exhibited a number of ornaments manufactured from the Pipestone by the North-west Fur Company. They consist of pipes of various patterns and sizes, cups, candlesticks, etc. They are turned in a lathe. Within a year or two this company have made nearly two thousand pipes, which they send up to the Upper Missouri Indians, near the foot of the Rocky Mountains, and trade them for a robe a-piece. Hereafter some doubt will be thrown upon the genuineness of these Indian pipes.

On favorable report of the Committee the following were ordered to be published.

On the Period and Ratio of the Annual Increase in the Circumference of Trees.

BY THOMAS MEEHAN.

The following experiments were instituted in order to ascertain whether the production of wood in trees was more rapid during some portions of the growing season than others, and at what periods growth commenced and ceased in the species of tree chosen.

The Carolina poplar (Populus monilifera *Ait.*) was selected on account of its rapid growth, enabling me to easily note the increase of circumference each seven days.

The following table shows the result. For the sake of system, the same day in the week was chosen. In order to tabulate the figures, the same date is used for the three years; but as the same day fell on different dates, there is a difference of three days in each date. For instance, May 17 in 1863 is May 18 in 1862 and May 20 in 1866—the three years during which the measurements were taken.

1866.	1862. Ft. In.	1863. Ft. In.	1866. Ft. In.
April 12 (Male catkins in flower.)			
" 15			3·6¾
" 22. (Leaf buds burst)			3·6¾
" 29			3·6¾
May 6		2·3	3·7
" 13		2·3	3·7¼
" 20		2·3¼	3·7½
" 27	1·10	2·3⅜	3·7¾
June 3	1·10½	omitted	3·8
" 10	1·10¾	2·3¾	3·8¼
" 17	1·11	2·4½	3·9⅛
" 24	1·11⅜	2·4¾	3·9¼
July 1	2·	omitted	omitted
" 8	2· ¼	2·5¼	3·9¾
" 15	omitted	2·5⅜	3·10⅛
" 22	2·1½	2·5⅞	3·10½
" 29	2·2	2·6¼	3·10⅝
Aug. 5	2·2¼	2·6¾	3·10¾
" 12	2·2½	2·6¾	3·10¼
" 19	2·2¾	2·6¾	3·11¼
" 26	2·3	2·6¾	3·11¼
" 31	2·3	2·6¾	3·11¼

From these figures it appears the tree increased in growth only during the three months between middle of May and middle of August, and that the ratio of growth is much greater during the month between middle of June and middle of July than during the month preceding and the succeeding month.

Third Contribution to the History of the BALÆNIDÆ and DELPHINIDÆ.

BY EDWARD D. COPE.

DELPHINIDÆ.

ORCA DESTRUCTOR mihi sp. nov.

Among the species of this carnivorous genus of Cetaceans, the present exhibits the most compact and powerful structure, and it, no doubt, is fully equal to any of them in its sanguinary habits. The breadth of the premaxilliary bones allies it to the species c r a s s i d e n s and m e r i d i o n a l i s, which have been called *Pseudorca* by some.

It differs from the latter species in the greater breadth and obtuseness of the muzzle of its cranium and mandible—all we possess of it—and in the smaller number of teeth; the premaxillary bones are relatively narrower throughout the greater part of their length.

The width of the muzzle at the lateral maxillary notch is a trifle less than three-fourths the length from that point to the end of the muzzle; the width at the fifth tooth is a little greater, and quite three-fourths that distance. The prenarial triangle is smooth, concave on each side the medium fissure, and extends to opposite the penultimate tooth. Teeth $\frac{8}{9}$, the posterior tooth being the last of the maxillaries, instead of the mandibulars, as in m e r i d i o n a l i s. The teeth occupy closely the intervals of the opposing series; those of the mandible are directed well outwards anteriorly. The intermaxillaries form an elevated ridge exteriorly opposite the notch; opposite the fifth tooth above each is less than double the width of maxillary exposed exterior to it. Behind the last tooth the margin of the maxillary is flared upwards in a steep arch; from opposite malar process to posterior tooth equals from posterior margin of latter to same of antepenultimate tooth. The mandibles are much depressed distally, and the symphysis equals one-third the length of the muzzle from the notch; the chin projects beyond the broad extremity of the premaxillaries. Measurements:—

	in.	lin.
End of muzzle to glenoid cavity	20	7
" " maxillary notch	11	6
" " last tooth (straight)	9	6
Length of symphysis	4	
" ramus mandibuli to condyle	20	3
Breadth of muzzle at notch	8	4·5
" " fifth tooth	8	6
" " anterior tooth	4	
Depth of ramus at last tooth	3	1
" " coronoid process	6	2

One specimen (No. 3679) is in the Museum Smithsonian Institution, Washington, from the Southern Pacific ocean, off Paita, Peru.

BELUGA ANGUSTATA m. sp. nov. *Beluga catodon* m. Proc. Academy, 1865, 278.

A study of the skeleton of the Beluga c a t o d o n (or *leucas*), deposited by the Smithsonian Institution in the Museum of Columbia College, Washington, convinces me that the species which I formerly regarded as the same is really quite different. For the present the following comparison will suffice:—

B. angustata.		*B. catodon* Fabr.
Tripodal	*Prenarial maxillary area;*	Triangular
Ten	*Dorsal vertebræ and ribs;*	Eleven
No vertebral canal	*Cervical vertebræ;*	One or two with vertebral canals, spine of axis elevated, tectiform.
Spine of axis flat;		
Coracoid deflected from plane, short;	*Scapula*	Coracoid long, slender, in plane of plate.
Shorter, superior outline regularly arched.		Elongate, superior margin with a long concavity.

In the specimen of the B. catodon, the o. o. palatina are slightly in contact; in the B. angustata the contact is extensive and quite as in B. concreta.

The B. canadensis resembles the B catodon, except in the form of the scapula, and of the prenareal maxillary area, in which respect it does not differ from the B. angustata. Examination of a specimen received by the Academy from Prof. Brunét, of the Lavalle University, Quebec, shows the postero-inferior process of the atlas to be present, Dr. Wyman's figure, previously cited by me, being erroneous in this respect.*

PHOCÆNA BRACHYCIUM, Cope, Proc. A. N. Sci., Phila., 1865, 279.

The specimen supposed by me to be the Ph. communis, with which the present species was compared, belongs to the Ph. vomerina* Gill, of the Californian waters. Having since received from the Smithsonian Institution two crania of the Ph. communis, from the North Atlantic, comparison shows a greater resemblance to the Ph. brachycium. The differences are, the maxillaries in communis are decurved, as in vomerina, and more than in brachycium; in communis the vomer appears more posteriorly on the palate, being less than its own length in advance of the line of the posterior teeth; in brachycium this distance is nearly double the length of the visible portion. The projecting portion of the pterygoids is equal to the portion in advance of the posterior margin of the maxillaries, while in the P. brachycium it is much less. The muzzle in advance of the posterior extremity of the vomer is barely contained 2½ times in the length to the extremity of the pterygoids, while it is one third that distance in the communis. In other respects the crania, including the teeth, are nearly similar; and it must be admitted that the full establishment of our species must depend on further investigations.

SAGMATIAS AMBLODON, sp. et. gen. nov.

Char. Gener. Supraorbital expansions of the o. o. maxillares obliquely descending and diminishing to a thin edge. No triangular prenarial depression; gonys short; teeth very short, obtuse, numerous.

It will be a matter of importance in the completion of the characters of this genus, to ascertain the presence of a dorsal fin. Supposing it to possess one, it remains intermediate between Delphinus sect. *Lagenorhynchus*, Gray, and Phocæna, differing only from the latter in the cylindric form of the teeth. Like the Phocænæ, the only species has the posterior extremities of the intermaxillaries much elevated and smaller. Supposing it to lack the dorsal fin, it will differ from Neomeris in the form of the teeth, from Beluga in the number of the teeth, and from Delphinapterus in the horizontal orbital plates and prenareal triangle of the latter.

Char. sp cif. Triangle replaced by a rugose area, which measures two-fifths the length of the muzzle from the notch. Muzzle entirely flat, premaxillaries in contact from nares to within two inches of end. On anterior half maxillaries not decurved to alveolar margin, but oblique; exposed portion at

* Proc. Acad., Phila., 1865, 178.

basal one-fourth, one third breadth of combined premaxillaries, not recurved on the margin. Antero-exterior ridge of nasals prominent, enclosing two pits behind margin of vomer; median portion of frontals separating nasals well from supraoccipital, and the same from each other by an anterior process; with an anterior process of supraoccipital forming a prominent knob. Supraoccipital crest remarkably strong and directed nearly horizontally forwards. Pterygoids in contact on the median line, posterior margins widely divergent; inferior angles separated, much rounded, median depression considerable. Common suture of palatines considerable, nearly equal gonys. Maxillaries closely in contact on the palate, not exhibiting vomer or premaxillaries, except a little of the latter on the distal inch. Coronoid process of mandible everted; ramus on distal half thickened internally, so that the dental series converge far less on the posterior half its length than on the anterior. Occiput transverse, little convexity between the posterior ridges of the temporal fossæ. Latter large, subrhomboid in outline. No portion of maxillaries visible between prenareal swellings; these elevations descend gradually anteriorly and are steep laterally, not grooved. Longest (right) prolongation of premaxillary not attaining nasal bone.

The remaining and more prominent features of this species are apparent from the following measurements:—

Length from end muzzle to convexity of occipital condyle	15·25
" " " notch	7·6
Depth of cranial chamber	4·9
Length of ramus mandibuli	11.75
" gonys	1·25
Width at temporal fossæ	7
" orbits	6·5
" notch	3·79
" middle of muzzle	2·5
" of prenareal elevations	2·79

The shelving form of the supraorbital plates of this species suggests a relationship to the Delphinus (Tursio) eutropia, Gray, but it is evident that the S. amblodon differs entirely from any species of Delphinus hitherto known.

The habitat of this species is uncertain. It was taken off the ship Vincennes, of the U. S. Exploring Expedition. On inquiry of Dr. Charles Pickering, naturalist on board of that vessel, he has no record or recollection of the capture of such a species; it was therefore probably procured while he was absent from the ship from Cape Horn to Lima, or afterwards during his stay on land in Australia and New Zealand.

DELPHINUS LONGIDENS.

Of the type of D. (Tursio) obscurus Gray, but with considerably longer muzzle and much longer prenareal triangle, the rugose surface of which extends to the end of the basal third of the length of the muzzle. Muzzle from notch just twice the length of cranial chamber, shorter than mandible, flat above on the basal two-thirds, the premaxillaries continuous with maxillaries, not bounding the triangle in front by a ridge. Sides of muzzle quite steep near tip. Prenareal portion of triangle full plane. Premaxillaries not visible on palatine surface till near tip; pterygoids not in contact, prominent ridge. Teeth slender, acute, spreading, four and an interspace in an inch, $\frac{3}{2}\frac{0}{7}$, anteriorly not separated by alveolar partitions; occiput flat, rounded in profile; nasal bones subtransverse, very near the moderate supraoccipital crest.

	in.
Length of cranial chamber	4
" cranium, total	15·25
" muzzle to notch	8·25
" mandible	12·25

Length of symphysis mandibuli	1·25
" temporal fossa	2·50
Breadth between orbits	6·30
" at notch	3 55
" at middle of muzzle	3·38
" of intermaxillary at middle	1·375

From the above it will be seen that the nearest ally of this species is the Delphinus (Lagenorhynchus) clanculus Gray, in which the muzzle is considerably shorter and the cranium relatively longer and wider; that is, length of cranium proper equal in the latter to the length of the muzzle, and breadth at orbits a little greater than either. Its form renders a distinction between *Lagenorhynchus* and Delphinus improbable, on present bases.

Habitat unknown. Museum Smithsonian, No. 3886.

DELPHINUS PLAGIODON, sp. nov.

A robust species of the subgroup *Tursio*, (Gray), with a strongly depressed triangle extending but little in advance of the posterior tooth. It is in many points allied to the D. doris, but differs in the muzzle being compressed rather than depressed, especially at the tip, the teeth fitting very closely and compressed transversely to the jaw, scarce four in an inch; and from the specimen of the Museum Salem, in having the mandible heavy and much prolonged at the symphysis. The form is an approximation to Steno, but the symphysis is short, nevertheless not more so than in St. tucuxi Gray. Until other characters are educed it will not be possible to distinguish Steno, Tursio, Delphinus and Lagenorhynchus as more than one genus. In this view I support the already expressed opinion of Lilljeborg.

Maxillaries much decurved, their elevation above the alveoli scarcely greater than that of the premaxillaries above themselves. The latter form a very strong rounded ridge, straight as far as visible in profile. Width at notch two and two-third times in length. Prenareal part of triangle moderately concave medially, with the terminal portion rugose. Supraorbital plates of maxillary externally thickened; in front of notch distinctly recurved. Pterygoids in contact, exteriorly plane, inferior angle sharp, included depression angulate. Vomer well displayed at middle of palatal face, not in contact with maxillaries; premaxillaries narrowly visible on the anterior half. Teeth $\frac{34}{32}$, stout, occiput flat transversely, prolonged, rounded in profile, and not acuminate, incurved. Supraoccipital crest rather weak. Measurements:—

	in.
Length to outline of occipital condyles	17
" maxillary notch	9·80
" of temporal fossa	3·1
" upper tooth line	8·25
" ramus mandibuli	14·4
" symphysis mandibuli	2
Depth of cranial chamber	4·75
Width at temporal crests behind	5·6
" above orbits	7·25
" at notch	3·55
" at middle of muzzle	2·375

Habitat is unknown. No. 3884 Mus. Smithsonian.

This species resembles closely the figure of the D. doris given by Dr. Gray in Zool. of Erebus and Terror, but does not at all agree with his description published in the Catalogue Cetaceans Brit. Mus., 1865, which applies closely to the specimen described by me, Proc. Academy, 1865. As the crania which have fallen under my observation are those of undoubtedly distinct species, I have been at a loss which to regard as the true D. doris. I think it would probably be more acceptable to the describer of the latter to regard

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the description written by himself as the more infallible test, than the figure drawn by another, and therefore more liable to error. A figure of that which coincides exactly with Dr. Gray's description will shortly be published.

It may be mentioned that the teeth of Delphinus e r e b e n n u s, stated by me to be truncate like those of the D. t u r s i o, on the authority of Dr. S. J. Howell, are found on examination to have an exceedingly oblique truncation behind, extending from the alveolar line to the apex.

PONTOPORIA CALVERTENSIS (*Delphinus calvertensis*) Harlan, Proc. National Institution 1842, 195.

This extinct species differs specifically from the recent P. b l a i n v i l l e i of the Southern Atlantic Ocean.

BALÆNIDÆ.

SIBBALDIUS LATICEPS Gray.

Catalogue Cetaceans, Mus. Britt. 170. *Balæna rostrata* Rudolphi, Berlin Abhandl. 1820.

An examination of the skeleton of the cetacean described by Prof. Taliaferro, Proc. Acad. 1866, page 8, and now deposited in the museum of the Academy by Dr. P. A. Taliaferro, has shown it to be the above named species, which is therefore to be added to the United States Fauna.

Length from end of muzzle over convexity of back, forty-six feet nine inches; girth about nineteen feet; length from end of muzzle to axilla, (external measurement,) fifteen feet; breadth of head across inferior margin of jaws, eight feet. Length of the pectoral extremity *four feet*, greatest breadth fifteen inches; they were situated close behind the angle of the mouth. There were 360 laminæ of black baleen, extending on either side of the mouth about six feet along the jaw, the longest about eighteen to twenty inches. The head was acute. The folds of the throat many and capacious. The dorsal fin was represented by a conical mass covered by horny integument, without any membranous appendage, situated well posteriorly. The body near the tail very slender. The flukes suddenly expand to a breadth of ten feet. The vertebral line from the dorsal fin to the flukes, with six or eight knobs or humps. Color, jet black above, including flippers, below white, sides beautifully marbled by a combination of the two colors.

	ft.	in.
Total length of cranium	10	3
Length supraoccipital to inferior margin of foramen magnum	2	7
" o. maxillare from orbital process frontal	6	3
Width do. at 3 ft. 1½ in		7·5
Breadth cranium from posterior angle to angle of orbital processes of frontal	4	8
From latter to plane posterior angle supraoccipital	2	2
Width supraoccipitals behind	3	3
" nasal meatus anterior to o. o. nasalia		9·25

The supraoccipital overarches on each side, a lateral longitudinal concavity, which passes under or downwards, behind the horizontal frontal plates. Superior inner edge of frontals raised ten inches above these orbital plates. Premaxillaries only three inches in diameter, leaving a wide median gap on top of the muzzle.

The os hyoides has very little longitudinal extent, the body being 9 inches long, while the base of each ceratohyal is 5·5 inches across; body most prolonged posteriorly, where it is narrowed, truncate, and with a deep longitudinal fissure.

The scapula is, as described for the species, like that of a Beluga, of considerable longitudinal extent, and furnished with long coracoid and acromion.

Of the anterior extremity, the humerus is less than half the length of the radius, thirteen inches long, with the articular surfaces for ulna and radius nearly equal.

The atlas possesses an acuminate median diapophysis, curved back, and with arterial perforation on one side. Spinal canal narrowed below, vertical depth 5·5 inches; breadth above 3·5, below at middle, 2. A strong inferior posterior process as in Beluga. Articular surfaces continuous.

The second, third and fourth cervicals with large completely united superior and inferior lateral processes. Neural canal broad, depressed: centrum transverse quadrate. Seventh cervical without inferior lateral process; the superior compressed slightly descending, equal depth centrum, 6 inches. Articular surfaces of ribs on third to sixth dorsals, crescentic. Dorsal vertebræ preserved, eleven: probably one or more have been temporarily removed. Neural spines elevated, especially on lumbar region, where the zygapophyses stand at only one-fifth the height of the arch and spine.

First rib, measurements:

	ft.	in.
Length, with curve of middle	2	11·5
Width at small tuberosity		4·75
" end		7·5
" middle		5·5

One of the longer ribs, with a slight ala on one edge, six feet long.

There are some peculiarities of the present individual which render its identification with the Sibbaldius laticeps not yet entirely established. Rudolphi observes that the acromion is very rudimental in his type, while in ours it is like the coracoid, well developed. Lilljeborg and Gray, l. c., state the dorsal fin to be compressed and falcate, while in the Mobjack specimen it is rudimental and conic. The hyoid bone is precisely as figured by Rudolphi. The dorsal fin resembles that of the *S. borealis* Fisch. (*gigas* Van Ben.), but the species differs markedly in the following points:

Dubar says the posterior dorsal median line is keeled; according to Dr. Taliaferro this one has several humps. Dubar's figure of the first rib differs very much from ours: former, end emarginate, its breadth $2\frac{3}{4}$ the length: the latter, end entire, breadth $4\frac{1}{2}$ the length. Our specimen is entirely adult at a length of 43 feet (axial); Dubar's specimen had attained 102 feet. This difference is important, as growth ceases with the coalescence of the epiphyses, as in other mammals. Lastly, Dubar's type possessed an inferior lateral process on the seventh cervical, wanting in ours.

The following extract from the Richmond Enquirer of Eighth month 23d, 1858, furnished me by Prof. Taliaferro, gives a lively account of the capture of this specimen:

"On Wednesday, the 4th inst., an unusual excitement was manifested among the fishermen at the mouth of North and Ware Rivers, on Mobjack Bay, and in a few moments scores of canoes might have been seen pulling up stakes and anchors, and making for the shore in every direction. It was soon reported that an immense fish, supposed to be a whale, of incredible dimensions, was cutting all sorts of capers in the Bay: blowing like ever so many bulls, spouting water, and amusing himself by making a great rumpus, to the great terror and peril of some of the citizens of the commonwealth, who 'go down to the sea' in small canoes. But after the lapse of a few hours nothing more was seen or heard of the monster, and the report of his visit scarcely excited attention, even if it commanded credence.

"On the Monday morning following, however, an extraordinary noise on the river (North) near Belle Ville, the residence of Warner T. Taliaferro, Esq., attracted the attention of the family about daybreak, and on hastening to the shore, they beheld the creature aground on a bar near the landing.

"The gentlemen, determined to attempt his capture, instantly leaped into a boat, and sent off for gigs, (small harpoons used by our fishermen for striking the bonito,) pulled around him to reconnoitre whilst the weapons were being procured.

"Whilst they were laying off, however, quietly reconnoitering the salient and weak points of attack, measuring with their eyes the length and breadth of their immense adversary, and impatiently awaiting the collection and arrival of the materials of war, the tide, which unfortunately was flooding, lifted him, just before the preparations for the attack could be completed, from his perilous bed in the sand, and with a prodigious effort he threw himself off the bar, bounded into the channel, and in an instant was out of sight.

"Nothing more was seen of him, and it was feared he had made his way out of the capes, and to the bergs and ice floes of more congenial latitudes, after his uncomfortable experiences of shallow water. But on Wednesday evening, the 11th inst., he was again descried making his way, like a small propeller, straight up North River, rising every ten or fifteen minutes, throwing graceful *jets d'eau* into the air more than thirty feet high, and sporting on the surface of the water. When off Burgh Westra, the residence of Dr. P. A. Taliaferro, that gentleman, with his brother, Edwin Taliaferro, Esq., accompanied by Mrs. ———, who, carried away by the excitement, insisted (under threat of having her own boat manned) upon joining the expedition, and witnessing the sport, as well as sharing the peril. Having hastily collected all the fire-arms at hand, consisting of shot guns and five-shooters, and having fastened a sword to a staff for a lance, they pushed off with a trusty crew of negro oarsmen, in a launch of twenty feet in length, and rowed boldly for the huge monster. He arose usually to breathe and spout water about every ten or fifteen minutes, and then descended, reappearing at the expiration of that time between a quarter and half a mile distant from the place of descent.

"Closely calculating the distance at which he would rise, and pulling in the direction in which he disappeared, they succeeded in measuring so accurately the time and space, that the third time he came to the surface after they started, they found themselves within a few feet of him, as he lay with his whole length exposed upon the water.

"To pour a heavy charge of buckshot into his flank was with Dr. T. the work of an instant, when off the creature darted like lightning, pursued with a hearty cheer by the boat's crew.

"Again and again he rose, and again and again was the gallant boat with her undaunted crew close beside him, pulling for their lives to head him, and cut off his retreat from the river to the bay. For some moments, at one time, he was seen swimming under the water, with his immense mouth, wide enough to have taken in and crushed the frail boat, extended, and making directly for her; but a few quick and lusty back strokes of the oars put her beyond peril,—and as he arose within ten feet of her quarter, a second discharge of ball and buck drove him frantic upon a bar, and the blood-tinged column of water which he spouted into the air told the story of a mortal wound.

"Pulling the boat within a few feet of his body, far enough off to escape a blow from his tail, Dr. T. courageously leaped overboard into five feet water, and boldly attacked him with an impromptu lance, made of an old Toledo blade which had done service in several wars. Though mortally wounded, however, and attacked sword in hand, the whale would not yield himself vanquished and a prisoner without another struggle, and, to the dismay of the assailants and the crowds which had by this time collected on the beach, by a convulsive and violent effort he floundered into deep water, and made a straight run for the bay. But he was now too much exhausted to escape, and the boat pulling fearlessly upon him, headed him within a few hundred yards, and drove him again upon the shore, upon the estate, and near the residence of Gen. Taliaferro, where cables and ropes were fastened to his tail, and he was dragged to the shore by a force of over one hundred and fifty negroes, who had assembled to witness the sport, and despatched, after a most exciting contest, from first to last, of over three hours.

"On dissection, the stomach was found to contain nothing but crabs."

The only other whale recorded as taken in the Chesapeake is mentioned in the above article as having been captured near New Point Comfort, Matthews County, north of Mobjack Bay, a few years previously.

On the REPTILIA and BATRACHIA of the Sonoran Province of the Nearctic Region.

BY EDW. D. COPE.

The material on which the present essay is based, is a collection made by Dr. Elliott Coues during a sojourn of sixteen months in and "travels over the Territory of Arizona from east to west, chiefly near the parallel of 35°, and along the valley of the Colorado from Fort Mojave to Fort Yuma." Notes of observations made by Dr. Coues on the different species materially add to their interest.

BATRACHIA.

Urodela.

Amblystoma? nebulosum Hallowell, Journ. Acad. Nat. Sci. (2.) v. 252, iii.

In the Siredon stage differing from the S. gracilis Baird in its oblique branchial arches with finer pectinations, and in coloration. On the anterior side of the third arch, twenty pectinations or rakers may be counted; in the S. pisciformis (or mexicanus) there are but twelve. Color in life "shining green above, silvery greenish-white below, more yellowish about legs and gills; a few obsolete scattered black spots on head and back. Eyes and branchial fimbriæ black," (Coues' notes). 455—56 ♀ from Jacob's well; No. 491♂ from a deep water tank in the rocks of the San Francisco mountains.

Male about seven inches long; branchiæ well developed; gular derm free half-way to symphysis mandibuli. Twelve costal folds. Muzzle slightly narrowed. jaws equal. Lateral and dorsal peritonæum black. The lungs extend to opposite the inguinal region. Corpus adiposum extending on testes to their anterior extremity. Testes undivided, broad, length equal half that from axilla to anus; efferent vessels numerous, not entering directly the vas uro-spermaticus. The latter is very slender, lying along the outer margin. but not in contact with, the narrow kidney; opposite the latter recurrently convolute, anterior to it straight, and extending to opposite axilla with decreasing diameter. It empties into the rectum near the cloaca. Cloaca protected on each side by a large vertical compressed gland, which is fringed on its inferior border, (which is received into the lip of the cloaca,) and also on its superior margin, which lies next the caudal vertebræ. It is continuous in front of anus; behind the two edges are pressed together. Integument of cloaca thrown into numerous appressed vertical plicæ, as in other Siredons.

Stomach straight, extending to the left groin, filled with larvæ of Diptera Nematocera. Intestines long, rectum large.

Female smaller, many of the ova black. In these animals the tarsal and carpal bones are fully formed, but cartilaginous. The pterygoid and palatine teeth in continuous series, the latter slightly separated medially, and concentric with maxillary series. On this character, preserved in a stage of an allied species without branchiæ, I proposed the genus Camarataxis, the validity of which can only be established when the development of all our Amblystomas is known. It is a stage nearer the larval condition than the transverse series of A. opacum, while the /\-shaped series of A. luridum is intermediate.

ANURA.

Spea hammondii Baird, Pac. R. R. Rept. Williamson's Exped. 1857, 12.
Cope, Journ. Acad. Nat. Sci. 1866, 81.
Two specimens.

Hyla arenicolor Cope, Journ. Acad. Nat. Sci. Philada. 1866, p. 84.
H. affinis Baird, U. S. Mex. Bound. Surv. Tab., not of Spix.
Two specimens. 732, "sides of abdomen and inside of thighs bright yellow in life."—Coues.

Bufo frontosus sp. nov.
A species most allied to the B. americanus, but differing in the shorter and more elevated cranium, longer and larger hind limbs, and more acuminate parotoid glands.
The canthus rostrales not marked, the muzzle descending very steeply from the anterior angles of the orbits, shorter than the elevated perpendicular muzzle. Frontal ridges higher than eyelids, rising steeply behind, terminating in two short convergent tuberosities, divergent, with interior crenations behind; postocular ridge equally developed, sending a very small process to the anterior acuminate extremity of the parotoids. Elevation of cranium at parietal tubercle equal to length of same from the same point. Eye large; tympanum distinct, half eye; parotoid narrow, long, acuminate at both ends. Elbow to anterior margin of orbit; heel to end of muzzle. Skin everywhere with numerous small tubercles; soles rough; toes half webbed.
Brown above, with pale vertebral line, and three pairs of deep brown medium sized spots, with paler centres. Sides and lips with small brown spots. Femur and tibia with one indistinct brown cross-bar each. Below uniform yellow.
Total length four inches, of which the head is 9 lines to postocular ridges; breadth between orbits 2·5 lines; hind limb 5 inches; sacrum 1 inch across. One specimen.

Bufo microscaphus sp. nov.
Head broader than long, obtuse, muzzle descending in full arc to labial border from line of orbit; superciliary ridges well marked, but concealed by the thick skin, plane, parallel; postorbital not prominent; vertical gutter narrow. Eyes large, prominent, double tympanum. Parotoids broad, smooth. Skin little roughened. Toes two-thirds webbed; shovel very small, frequently not black-edged, outer tubercle small, heel to end muzzle.
Above blackish, a black spot on each parotoid, and dark light centred bar on femur and tibia; a yellowish bar across front and palpebræ, and spot on nape; muzzle dark.
Total length 1 in. 5·5 l.; to postorbital ridge 7·5 l.; fore limb 1 in. 9 l.; hind limb 3 in. 2 l.; femur $\frac{1}{8}$ included.
The oval, well separated parotoids and general appearance of this species ally it to the B. speciosus Girard, but in that animal the supraorbital ridges are obsolete, and the metatarsal shovel is very much stronger. The B. dorsalis Hallow. (*B. woodhousei* Gird.) is also allied, but is in all proportions and details more elongate, and has a stronger shovel and head ridges; it always has the dorsal band, which never exists in the microscaphus, and never the transverse face-band of the latter.
Numerous specimens in Dr. Coues' collection, also two previously in Mus. Smithsonian (4106, 4184), from the upper Colorado region, procured by H. B. Möllhausen.

Rana halecina Bosc.
Near Fort Wingate; Zuni City.

REPTILIA.

SAURIA.

Iguania.

Phrynosoma douglassii Bell. *Tapaya ornatissima* Girard, Herp. U. S. Expl. Ex. 1858, 396.

Abundant, and exhibiting much variety of coloration, some being uniform brown above, some with dark cross-bars, light edged behind, some with dark oval spots, and some with dark yellow-edged spots; others have the temporal spines and sides of the head bright red. The length of the tail varies from one and three-fourths to two and three-fifths times in the total. From Fort Whipple, San Francisco Mountains, and the Colorado Chiquito River. The two from the last locality are the only ones with oval brown yellow-edged spots. Dr. Coues says of this species: "Very abundant at all points from Santa Fe to Fort Whipple, chiefly in dry and sandy or rocky situations. The males are usually smaller and more delicate in form than the females. Those of the latter sex taken after the middle of July were almost invariably pregnant, and the young appeared in great numbers after the first of August. When on sand or soft soil, the horned frogs watch their chance, and when they think nobody is looking, they quickly and quietly bury themselves quite out of sight. This is accomplished by a gradual, insinuating, lateral and forward wriggling of their bodies: nose down, and paws drawn to their sides. When newly caught, some of the larger specimens are a little inclined to be irascible and pugnacious; and they bite, but rather weakly. If a dog approaches, they stretch up on their legs, swell out their bodies, open their mouths, and make a low hissing noise. This is about all they do, however. They always become tame and quiet after a few minutes' handling. They eat readily, snapping at passing flies, and catching them by protruding their viscid, fleshy tongues. When tickled with a straw they lean the whole body towards the side touched, humping up their backs, and setting their horns; but this is the utmost they do on the defensive, torment them as you may."

Phrynosoma brevirostre Girard, Herp. U. S. Expl. Exped. 1858, 377.

One specimen from Bero Springs (No. 407). This species is very near the P. douglassii, but has the muzzle and nostrils of the P. cornutum type, that is, the latter on the front of the muzzle; the tail is also very short, being a little over one-third length of head and body; above with a few pairs of pale-edged brown spots. I am not prepared to depend on its permanent distinction from the P. douglassii.

Phrynosoma platyrhinus Girard, Stansbury's Report, Utah, Reptiles, 263.

Phrynosoma modestum Girard, 1852, Herp. U. S. Expl. Exped. 1858, 365, Tab. vi. Bero Spring.

As a synonym of Ph. regale Girard, is to be placed *Ph. solaris* Gray, Catal. Sauria Brit. Mus., 229. Ph. blainvillei Gray, l. c. 228, is the common species of California which has been called Ph. coronatum by Girard. The latter species, of Blainville, has been sent by John Xantus to the Smithsonian Institution from Lower California, where alone it has been found.

Crotaphytus collaris Say, Holbrook, N. Amer. Herp. ii. 1842, 72, tab.

From Bero Springs and along the Colorado Chiquito River, where they are abundant. Dr. Coues says of its habits: "Occurring on sand, logs, among brush, etc. Throat very dilatable, os hyoides large and strong. Length 11—12 inches. Bites fiercely, and a little powerfully when caught. Common all along the Colorado Chiquito River.

"In confinement, this species is just the opposite of the smaller lizards and of the horned frogs. They retain to the last their fierceness and irascibility, and their biting inclinations. My specimens were all perfectly untameable, though petted for several days; they all ultimately died, apparently of pure rage and chagrin at being trapped. They bit fiercely at the finger, and whipped good-sized dogs. They also bite indiscriminately a stick or anything else presented to them; and hold on so tenaciously that I have hung them up for half an hour by their hold on a stick or string. They were ever on the alert, watching every motion with cunning and wrathful eyes. Every now and then they would seem to lose their tempers completely, and tug frantically at their 'lariettos,' leaping fiercely about in all directions. They refused all food, and their lovely colors faded very perceptibly some time before death."

Crotophytus wislizenii Baird, Girard, Proc. Acad. Nat. Sci. 1852, 69. *C. fasciatus* Hallow., *C. gambelii* B. G.
Colorado Chiquito River.

Holbrookia propinqua Bd., Gird., Proc. Acad. Nat. Sci. 1852, 126.
Navajo Springs; Fort Wingate; San Francisco Mountains; Colorado Chiquito River; Zuni City. "Very abundant; not very agile."

Holbrookia maculata Girard, Proc. Amer. Assoc. 1650, 201.
Fort Whipple.

Holbrookia texana Troschel, Wiegm. Archiv. 1850, Tab. Bd., Gird., Proc. Acad. Nat. Sci. Philada. 1852.

Uta symmetrica Baird, Proc. Acad. 1858.
Bero Springs, near Fort Wingate. "On rocks in a cañon. Very agile, and difficult to secure. Tails very fragile.
"All have lemon or orange-yellow throats. Of some the bellies are plain silvery white; of others bright greenish olive. Some are deep greyish-black above, others much lighter, with a dark lateral streak. The former I procured on light yellowish sandstone; the latter on dark blackish lava rocks. Saw none except on rocks." (Coues' notes.)

Sceloporus consobrinus B. &. G., Marcys' Report, 1853, 237.
San Francisco Mountains; Colorado Chiquito River; Zuñi Mountains. In dry pine woods.

Sceloporus graciosus B. &. G., Proc. A. N. S. Phil., 1852, 69. *Sc. gracilis* B. & G., l. c.
Colorado Chiquito River, in sandy situations; Navajo Springs.

Diploglossa.

Heloderma horridum Wiegmann, Herpet. Mexicana Tab. Baird U. S. Mex. Bound. Surv. Tab.
Fort Whipple. Yellow orange, the black cross bars parallel and connected margins of orange spots.

Leptoglossa.

Cnemidophorus sexlineatus Linn. var. gularis Bd. Grd. *Cnem. gularis* B. G., l. c. 1852, 128. *Cn. guttatus* Hallow., l. c. 1854, 192.
Fort Wingate; Colorado Chiquito River; Lithodendron Creek.
"This is the lizard, *par excellence*, of Fort Whipple and vicinity. All summer it has been very numerous in and about the Fort—coming into our tents at all times, silently and furtively hunting for flies. Although so familiar, it is exceeding timorous and darts out of sight at the least movement or noise. It is, I think, by far the most agile of all its tribe. When running on level ground the eye can hardly follow it; but receives merely a dim impression of

a lengthy streak of black and yellow. I found it impossible to secure specimens till I hit upon the expedient of shooting them with a small charge of mustard seed shot out of an old fashioned pistol; with which I could procure any quantity of them. They live chiefly in high dry open woods, among dry leaves, at the feet of bushes, etc. They are emphatically ground lizards, not tree or rock species."

Plistodon obsoletus Bd. Gird, l. c. 1852, 129.

Plistodon guttulatus Hallowell, Proc. Acad. Phila., 1852, 206.
Fort Whipple.

OPHIDIA.

Asinea.

Contia isozona n. sp. nov.

Char. Two postoculars; six rows of gular scales. Rostral rounded, slightly produced backwards. Scuta 158 $\frac{1}{1}$, 52. Twenty black half rings, separated by equal spaces of pinkish ground color.

Descr. Eye small, diameter twice in length of muzzle. Preorbital narrower above, not extending above lower margin of superciliary; loreal twice as long as high. Prefrontals and internasals much broader than long; frontal slightly angulate in front, longer than broad; parietals rather elongate, subtruncate behind. Postorbitals subquadrate, temporals 1—2. Postgenials minute. Superior labials seven, all higher than long, eye over third and fourth. Scales in fifteen rows, all broader than long. Tail four and two-fifths times in total length, which is 10·25 inches. Below immaculate; tail completely six-annulate.

Another specimen from the Museum Smithsonian, from Rockville, Kane Co., Utah, from A. L. Siler, indicates a variety. The body is longer than in the type, and is crossed by twenty-five black bars, between these and on top of muzzle vermillion, below yellow. Scuta 167 $\frac{1}{1}$ 52. Both specimens resemble the Sonora semiannulata B. & G., but that species has two nasals, three postoculars, the superior reaching the frontal; frontal wider behind than before, and only 149 gastrosteges.

Rhinochilus leconteï Bd. Gird., Catalogue 120.

A well marked variety, having fewer (twenty) black half rings on the body extending to the gastrosteges and separated by a narrow interval. Abdomen with subquadrate black spots opposite the former and their intervals. Otherwise as types.

Phimothyra hexalepis n. sp. nov.

Resembles the P. grahamiae (*Salvadora* B. G) but differs in having a shorter tail, five and one-third times in length, instead of four times; eye resting on sixth supralabial on account of the presence of three narrow preoculars; two or three loreals—largest higher than long; nostril on suture between nasals and internasals; dorsal stripe narrow—one and two half scales and lateral brown band wide, four and a half to five scales, whose *superior* margins are ochraceous at base. Rostral plate well developed, higher than broad. Nasals elongate, much depressed, anterior extending behind first labial; postoculars two; two long narrow temporals. Width of occipitals nearly equal common suture. Nine superior labials; first pair inferior labials much dilated medially, their common suture nearly equal that of pregeneials. Scales seventeen rows. Gastrosteges 176, urosteges 75. Tail and below uniform yellowish.

Fort Whipple. The stomach contained a Cnemidophorus sexlineatus.

Hypsiglena ochrorhynchus Cope, Proc. Academy 1860, 246. Var. chlorophaea, l. c. 247.

Specimen with the small spots (sixty-six dorsal usually divided) of the variety described as above as a species.

Ophibolus b o y l i i Baird and Girard, Serpents 82.

Specimen with loreal minute on one side, wanting on the other. As the practice of employing generic names which have not been explained by a diagnosis is a very questionable one, and only to be allowed in case of necessity, I employ in this and other cases Baird and Girard's names in preference to the prior ones of Fitzinger; e. g. the above, in place of *Lampropeltis*.

Ophibolus p y r o m e l a n u s m. sp. nov.

Char. Scales in 23 longitudinal rows; tail five and one-half times in total length. Scuta 224, 1, 66. Fifty to fifty-eight black annuli on an ochraceous white ground, on the body; each anteriorly completely, posteriorly more or less incompletely split by a vermillion annulus; all extending with irregularities on the belly.

Descr. Head quite distinct from body, muzzle contracted. Frontal plate broad, with prolonged apex; parietals elongate, emarginate behind; cephalic shields otherwise as in p o l y z o n u s, s p l e n d i d u s, etc. Postgeneials half the length of the pregeneials. Dorsal scales rather broad, outer series not abruptly enlarged. In one specimen all the black annuli to the middle of the tail are divided by the red, thus leaving the black as a margin to it; hence the number of these annuli is fewer; they are four scales wide behind the middle of the body; in another specimen only four anterior rings are completely divided, those on the following third of the length being divided by red on the sides; the remaining annuli black, three scales wide; white annuli one and one-half scales; anterior or nuchal red; annulus widest, its anterior black margin attaining parietals; an ochraceous band from gular region, not quite completed across parietals. Muzzle, prefrontal plates and labial margin ochraceous, remainder of top and sides of head black. Total length 30·5 inches. Nos. 731—760.

This species has a longer body than the known red-ringed species, and is indeed most closely related to the O. b o y l i i; it will always be distinguished from the latter by the much more numerous annuli (twenty-eight in b o y l i i.)

Pityophis b e l l o n a Bd. Girard Serpents. Stansbury's Exploration, 1852, 350.

Numerous specimens illustrate well the great variability of the shields of this species. About half do not possess the anterior frontal (vertical,) several have two loreals on one side, some have one preocular on one side, some on both, (typically two;) four postoculars occur on one side only in two specimens, and one has the eye on one side resting on the fifth superior labial, the others on the fourth. Apparently the most abundant snake in the region explored by Dr. Coues.

Masticophis t e s t a c e u s Say, Long's Expedition, 1823. *Herpetodryas flavigularis* Hallowell, Pr. A. N. S., 1852.

Masticophis t a e n i a t u s Hallowell, (*Leptophis*) Proc. Acad. 1852. *M. schottii* B. G., Catalogue Serpents. *Leptophis lateralis* Hallow., Proc. Acad. 1853.

The young, of the form *lateralis*, the adult, the *taeniatus*.

Eutaenia v a g r a n s B. & G., Catalogue.

Var. with top of the head black. From Zuñi City, in water. Var. with head brown; like back from San Francisco Mountains.

Eutaenia o r n a t a B. & G., U. S. Mexic. Bound. Surv. Tab. *E. parietalis* B. & G., Catalogue Serpents.

A very distinct species from the last. Superior labials seven; postgeneials considerably longer than pregeneials. Tail three and three-fifths in total

length. Scuta 167, 1, 85. Lateral stripe on second and third rows of scales; vertebral band not visibly black margined. Color above apparently uniform olivaceous until the skin is stretched.

Eutaenia cyrtopsis Kennicott, Proc. Academy, 1860, 333.
Four specimens, Fort Whipple.

Eutaenia macrostemma Kennicott, l. c. 1860, 231.
Two specimens, Fort Whipple.

The following comparative table will assist in the recognition of these and some other scarcely known species of the genus.

Scales in nineteen rows; lateral stripe on the second and third rows:

Form stout. Temporal small, not attaining the reduced last upper labial; superior labials seven; nuchal blotches same color as head: one series of numerous brown bars connecting the light stripes, none of which are black edged..... scalaris*

Form slender. Temporal large, margining the last three upper labials, none of which are reduced; superior labials eight (seven;) general color brown, large nuchal blotches and a double series of very small lateral spots black; latter forming continuous zigzag on stretched skin; no black margins. cyrtopsis.

Form slender, tail three and two-fifths in total; head narrow, elongate, loreal longer than high; seven superior labials, temporal not extending beyond penultimate; above uniform, except on stretched skin, where there is a broad border to dorsal vitta and one lateral row of black spots separated by rufous..... ornata.

Scales in nineteen rows; lateral stripe on third and fourth.

Form stout, head short, rounded, occipital regions convex; labials 7—8, temporal plate small; gastrostega 138—148; tail one-fifth total length. Olive brown, unspotted, dorsal and lateral stripes yellow, black bordered; lips, chin and a postoral crescent to near occipitals, with occipital spots, golden yellow; two small black nuchal spots.... (sp. nov.) flavilabris.†

Scales in nineteen rows; no longitudinal bands.

Olive brown, with four series of small black spots, and a trace of two exterior anteriorly; eight superior labials, last very small, no black margin on the sixth or posterior margin of eighth, but a strong black band from eye across posterior margin of seventh to mouth. Sides of head white, extending upwards as two areas, margining each occipital; behind each a black nuchal spot separated by a narrow white line from its fellow, and extending over occipital plates and half of frontal; prefrontals transverse..... ..... sumichrasti.‡

Scales in twenty-one rows, lateral stripe on the third and fourth.

Frontal plate longer than occipital suture; temporal small, margining only anterior part of penultimate labial; post-

* *Thamnophis scalaris* Cope, Pr. A. N. Sci., 1860, 369, from Jalapa, DeOca. Also Orizava, Prof. Sumichrast, Nos. 36, 37.

† Two specimens Museum Smithsonian, from the Table Land or Southern Mountains of Mexico, sent by Dr. Chas. Sartorius—vide Proc. Academy, 1865, 197. One specimen exhibits eight upper labials, the other seven; in the latter, one preocular is divided, and four posterior superior labials united.

‡ The markings of this species are entirely peculiar; it is also distinguished by the transverse or narrow prefrontals and internasals. Orizava, Mexico, Prof. F. Sumichrast; No. 45.

geneials longer than pregeneials; superior labials eight; loreal higher than long, olivaceous, with one row of small black spots below, and two rows above the lateral stripe. Two small black nuchal spots and a short postoral pale crescent..... macrostemma.*

Scales in twenty-one rows, lateral stripe on the second and third.

Frontal plate shorter than common occipital suture; temporal small, superior labials eight, postgeneials equal or shorter than pregeneials. Ashy, sometimes brown, with narrow, unmargined stripes and very small lateral spots in two rows..... vagrans.

Heterodon nasicus B. & G. Stansbury's Explorations, 1852, 352.

Proteroglypha.

Elaps euryxanthus Kennicott, Proc. Acad., Philada., 1860, 337.
Two specimens. Fort Whipple.

Solenoglypha.

Caudisona molossus Bd., Gird., Catalogue. Baird, U. S. Mex. Bound. Surv., Tab.
Two specimens; dry rocky ground, San Francisco Mountains.

Caudisona scutulata Kennicott, Proc. Acad. 1861.
One specimen, twenty inches long; San Francisco Mountains.

Caudisona confluenta Say, Long's Exped. Rocky Mts., ii. 1823, 48. Baird and Girard, Catalogue, 8.

Four specimens of this species, which correspond more or less closely with Say's diagnosis, one of them especially, in having the cervical maculæ confluent into a band. The animal called by this name by Baird and Girard, and named *C. lecontei* by Dr. Hallowell, which is found on the eastern slopes of the Rocky Mountains and the central plains of Kansas, Missouri, etc., differs from the Arizona form, as I pointed out in Synopsis of Crotali in Mitchell's Researches, not having then seen specimens of the latter; yet the two are probably varieties of but one species. They differ as follows:

Var. confluenta: sixteen superior labials, (eight to) ten rows of scales between superciliaries; ground color above bluish slate, no yellow band between eyebrows, on rostral, or margining labials in front. Spaces between dorsal spots orange.

"San Francisco Mountains (510). No. 801 under a log on a mountain, altitude 12,000 feet. 572. No. 678, thirty-one inches long, had an adult Sialia mexicana in its stomach."

Var. lecontei: fourteen superior labials, six between superciliaries. Ground color, and space between spots brown; a yellow margin to mouth and rostral plate, and band between supercilia.

No specimens from Arizona.

Caudisona lucifer Baird and Girard, Catalogue, p.

The numerous specimens of this species brought from Arizona by Drs. Coues and Irwin are nearly black, especially the head.

509—511, etc., San Francisco Mountains.

* In Mus. Smithsonian there are two varieties, neither of which agree strictly with Kennicott's type. First, the two from Dr. Coues, in which the lateral spots are minute, not in contact, and the dorsal vitta more or less black margined; and second, three specimens from Mirador, Vera Cruz, Dr. Sartorius. In these the spots are quadrate, large, including the inferior row; those of the two superior in contact at their angles. Gastrostega of the first 163, of the latter 160.

Caudisona pyrrha sp. nov.

Scales in twenty-five series, broad and rounded, the two inferior rows smooth. Head short and very obtuse, the nostrils opening subvertically. Superior labials higher than long, three rows of temporals smooth; scales of vertex small, keeled; those more anterior, striate. Superciliaries broad oval, striate. Canthus rostralis none. Inferior labials fifteen, the first and second margining a plate which meets its fellow in front of the geneials, and is in other species a continuation of the first. Gastrosteges 178, urosteges 24; joints of rattle 9. The general tint of this species is a bright salmon red, the scales of the inferior rows punctulate with brown. Other details of structure and coloration are given in the description below.

The species is one of the most handsomely colored of the genus. Its affinities are with the C. mitchellii m., but it exhibits an even higher degree of subdivision of the head shields. Mus. Smithsonian, No. 6606.

I am now acquainted with eighteen well defined species of this genus, while one or two named remain to be further investigated. They are distributed as follows:

Regio Neotropica	5	
S. R. Brasiliana		2
S. R. Mexicana		4
Regio Nearctica	13	
S. R. Sonoriana		10
S. R. Californiana		1
S. R. Media		3
S. R. Orientalis		2
	18	

The intensity of distribution is then the Region of Lower California, Upper Sonora and Arizona, which has seven peculiar species, and three which enter from the neighboring districts.*

The scattered nature of the literature of this subject renders a synopsis of the species of this important genus desirable. The genus divides itself into two natural sections:

I. Top of muzzle covered by three pairs of symmetrical shields in contact; nasals distinct.

a. Rattle acuminate.

C. DURISSA Linn. Scales in twenty-nine rows, four rows scales below orbit. Yellow, with two brown longitudinal bands on anterior part of body, remainder with black rhombs embracing yellow centres. Surinam and Mexico, to Vera Cruz.

C. TERRIFICA Laurenti. Four rows scales below orbit; brown, with two darker bands above anteriorly, and a series of large darker dorsal rhombs with yellow outlines. Brazil, Mexico.

C. BASILISCA Cope. Two and three rows scales below eye; rows on body 29; labials 14. Yellow-brown, with large adjacent chestnut-red, yellow-bordered dorsal rhombs, alternating with chestnut spots; no longitudinal bands anteriorly. Western Mexico.

aa. Rattle parallelogrammic.

C. MOLOSSUS Bd. & Gird. Twenty-nine rows of scales, eighteen labials, separated by five rows from orbit. Brownish-sulphur above, with small transverse reddish dorsal rhombs, the angles produced as lateral bands; no longitudinal bands on neck; tail black. Arizona, New Mexico.

* These facts have been pointed out, Proc. Acad. 1861, 294.

II. Nasal plates distinct; muzzle with small plates or numerous scales above.

a. Muzzle with two marginal shields above each canthus rostralis.

β. An elevated narrow cuneiform rostral.

γ. The rattle acuminate.

C. POLYSTICTA Cope. Scales 27 rows; sup. labials 14; separated from orbit by two rows. Gray-brown, with seven longitudinal rows of brown spots; top of head variegated. Mexico.

C. TRISERIATA Wagler. Scales twenty-three rows; two pairs of large scales on top of muzzle; six rows between orbits. Yellowish, with a dorsal series of sub-round brown spots. Mexico.

C. CONFLUENTA Say. Scales 25–7 ? (–9) rows; labials 15 to 18, separated from orbit by four rows; six to ten rows between superciliaries Yellow line from supercilium above angle of mouth; a medial dorsal row of brown spots emarginate before and behind, with two alternating lateral series. Central and south-west North America.

γγ. The rattle parallelogrammic.

C. LUCIFER Bd. Gird. Scales 25–7, labials 15–16, with four rows above them. Numerous sub-round blackish dorsal spots, separated by narrow yellow lines; a light band from supercilia above angle of mouth. Pacific region North America and Arizona.

C. SCUTULATA Kennicott. Scales 25 rows, superior labials 16; three or four rows interorbital scales, bounded in front by two shields. Yellow stripe from eyebrow above rictus oris; yellowish-brown, with a dorsal series of truncate brown yellow-edged rhombs; tail black-ringed. Arizona.

C. ATROX Bd., Gird. Scales 25–7 rows, labials 15; muzzle with small scales above; yellowish, with a dorsal series of complete yellow-edged brown rhombs; yellow band from supercilium above angle of mouth. Texas and Sonora. Tail black-ringed.

C. ADAMANTEA Beauvois. Scales 27 rows; labials 15—16; muzzle above with small scales, acuminate. Brown, with three series of brown yellow-edged complete rhombs, the median larger, only separated by their yellow margins; a yellow line from supercilium to angle mouth. Florida and Georgia.

C. HORRIDA Linnæus. Scales 23—5 rows, all carinate; labials 12—14; two rows between them and orbit. Light line from superciliary plate to angle of mouth; two series of dorsal rhombs, confluent except on the anterior part of the body, forming transverse zigzag blotches; tail black. Eastern district of North America.

ββ. An equilateral broad or depressed rostral. Rattle acuminate.

C. ENYO Cope. Scales 23 rows, sup. labials 13; superciliaries separated by six rows; scales on muzzle small. Above yellow, with a median series of small transverse rhombs, which are prolonged into vertical lateral black bars; former median and longitudinal on neck; light line to above canthus oris. Lower California.

C. TIGRIS Kennicott. Scales 21—3 rows, numerous smooth plates on top of muzzle; labials 14, separated by two rows from orbit, superciliary space wide. Yellowish ash, with small doral blotches on anterior one, and cross-bands on posterior two-thirds of body. Deserts of Gila and Colorado.

αα. Upper margin of canthus rostralis with small scales like the others.

ι. Prenasal in contact with rostral; superciliary prolonged into a horn.

C. CERASTES Hallowell. Two elongate preorbitals; rostral broad as high; rattle parallelogrammic. Scales 21—3; labials 11—13. Light yellowish,

with several series small brown spots, median largest. Deserts of Gila and Colorado.

a. Prenasal separated from rostral by scales; superciliary not prolonged.

C. MITCHÉLLII Cope. Rostral broad as long; scales 25 rows; labials 16, separated from orbits by three rows; two elongate preorbitals, one loreal; yellowish-gray, with indistinct quadrate dorsal spots separated by yellow, and becoming cross-bands on posterior fourth. Rattle parallelogrammic. Lower California.

C. PYRRHA Cope. Rostral broad as long; head very obtuse rounded. Scales 25 rows, seven between superciliaries, three below orbit; labials 14; two very small preorbitals and four lorcals. Pale vermillion varied with yellow on the sides of the belly, with numerous large reddish-bay transverse hexagons, which become transverse bands on posterior two-thirds of length; yellow below. Rattle subacuminate. Arizona.

The *C. lepida* of Kennicott remains, which is the type of a genus now first defined under the name of

APLOASPIS m., and characterized by the presence of a single large nasal shield, which is pierced by a small central nostril.

I. Muzzle with numerous smooth plates above.

A. LEPIDA Kennicott. Rostral broad, low; scales of top of muzzle and vertex large, smooth; upper preorbital very small, loreals three; labials twelve, separated by one row from orbit; no postocular band. Rio Grande, Texas.

TESTUDINATA.

Aromochelys carinatus Gray, Catal. Shield Rep. Brit. Mus. *Ozotheca tristycha* Agassiz, Contrib. N. Hist. U. S., vol. i.

To the forty-four species procured by Dr. Coues may be added the following, procured by Dr. Irwin from the neighborhood of Fort Buchanan (near Tucson), in the southern part of the territory:

Uma notata* *Bd.*
Gyalopium canum *Cope.*
Trimorphodon lyrophanes *Cope.*

Added chiefly by Maj. Emory, on the United States and Mexican Boundary Survey, mainly according to the Report by Prof. Baird.

Cnemidophorus melanostethus *Cope.*
" gracilis *Bd.*
Euphryne obesa *Bd.*
Uta graciosa *Hallow.*
Sceloporus clarkii *Bd., Grd.*
Dipsosaurus dorsalis *Hallow.*
Callisaurus ventralis *Hallow.*
Phrynosoma regale *Gird.*
" maccallii *Hallow.*
Coleonyx variegatus *Baird.*
Caudisona atrox *Bd., Gird.*
" tigris *Kenn.*
" cerastes *Hallow.*
Tropidonotus validus *Kenn.*
Ophibolus splendidus *Bd., Gird.*
Phimothyra grahamiæ *Bd., Gird.*
Sonora semiannulata *Bd., Gird.*
Chionactis occipitale *Hallow.*
Diadophis regalis *Bd. Gird.*
Bufo alvarius *Gird.*
" debilis *G.* (*insidior* Gird.)
Hyla cadaverina *Cope.*

In all, sixty-eight species, referrable to twenty-seven genera. Of the latter there are:

* This is the only adult in the Smithsonian Museum, a young specimen having previously served as the type. The genus is distinguished from Callisaurus by the presence of a series of spines moveable on their bases, on the outer margin of the foot.

The coloration is peculiar; ground color black, covered everywhere by large yellow (red?) discoform spots, whose margins are everywhere nearly in contact, leaving a pattern like the refuse of a button-maker's plates; each spot has a black centre. Length eight inches, tail short.

I.	II.	III.
Entirely or nearly entirely Nearctic.	Nearctic: extensively distributed in Mexican district of Neotropical R.	Nearctic: extending into Continental district of Neotropical.
Phrynosoma,		
Crotaphytus,		Cnemidophorus,
Holbrookia,	Sceloporus,	Heterodon,
Plistodon,	Ophibolus,	Masticophis,
Contia,	Eutænia,	Elaps,
Diadophis,	Tropidonotus,	Caudisona,
Pityophis,	Rana,	Bufo,
Aromochelys,	Spea,	Hyla.
Amblystoma.		
Sonoran Species 19.	Species 13.	Species 22.

IV. Genera confined to the Sonoran district, which extend into the Mexican:
Uta, Heloderma, Euphryne, Phimothyra.
Sonoran species 5.

V. Genera confined to the Sonoran district which do not extend into Mexico:
Callisaurus, Dipsosaurus, Uma, Sonora,
Gyalopium, Chionactis.
Species 6.

VI. Genera chiefly Mexican, which extend into the Sonoran district, (the first two to the Rio Grande):
Coleonyx, Hypsiglena, Trimorphodon.
Species 3.

Of the nineteen species embraced in the first table, there are—

Found in Pacific district,	Middle district,	Peculiar,
Phrynosoma douglassii.	Phynosoma douglassii,	Phrynosoma, 5 sp.,
	Crotaphytus collaris,	Crotaph. wislizenii,
	Holbrookia maculata,	Holbr. propinqua.
	" texana,	Contia isozona.
	Plistodon guttulatus,	Diadophis regalis,
	" obsoletus,	Amblystoma nebulosum.
	Pityophis bellona,	
	Aromochelys carinatus.	
1 sp.	8 sp.	10 sp.

Of the thirteeen species of the second table there are of the same character—

Sceloporus graciosus,	Sceloporus consobrinus,	Ophibolus pyromelanus,
Ophibolus boylii,	" clarkii,	" splendidus,
Spea hammondii.	Eutænia vagrans,	Eutænia cyrtopsis,
	Rana halecina.	" macrostemma,
		" ornata,
		Tropidonotus validus.
3 sp.	4 sp.	6 sp.

Of the twenty-two species of the third table of genera, the distribution in the same respects is as follows:

Masticophis tæniatus,	Cnemidophorus 6-lineatus,	Cnemid. gracilis,
Caudisona lucifer.	Heterodon nasicus,	" melanostethus,
	Masticophis testaceus,	Elaps euryxanthus,
	Caudisona confluenta,	Caudisona scutulata,
	" atrox,	" pyrrha,
	Bufo dorsalis.	" molossus,
		" tigris,
		" cerastes,
		Bufo microscaphus,
		Hyla arenicolor,
		" cadaverina,
2 sp.	6 sp.	11 species.

It then appears, from the preceding tables, that the species of this district are of the following distribution:

Occurring in the Pacific district			6
" " middle "			18
Confined to the Sonoran dist.	Tab. I	10	
	II	6	
	III	11	
	IV	5	
	V	6	
	VI	6	
			44

We may now institute some comparisons with the Reptile fauna of Cape St. Lucas, based on the material obtained by Consul Jno. Xantus; and give first a

Tab. VII. Genera common to Cape St. Lucas and Arizona:

Caudisona,	Uta,
Trimorphodon,	*Callisaurus*,
Hypsiglena,	Sceloporus,
Pityophis,	Phrynosoma,
Tropidonotus,	*Dipsosaurus*,
Eutænia,	Cnemidophorus,
Phimothyra,	Bufo,
Masticophis,	Hyla.
Ophibolus,	

Seventeen, of which five are peculiarly characteristic of the Sonoran district among those of the Nearctic Region, as per tables iv. v. vi.

I have already pointed out (Proc. Acad. 1861, 305*) that of the sixteen species of Ophidians of Cape St. Lucas eight are peculiar to it; as the Hypsiglena of Arizona is probably not different, the number should be reduced to seven. Of the remaining nine there are—

Of the Pacific district,	Sonoran,	S. Central,
Ophibolus boylii.	Caudisona atrox,	Caudisona atrox,
	Trimorphodon lyrophanes,	
	Hypsiglena ochrorhynchus	
	Tropidonotus validus,	
	Eutænia cyrtopsis	
	Phimothyra grahamiæ,	
	Masticophis testaceus,	Mastic. testaceus.
	Stenostoma humile.	
1 species.	8 sp.	2 sp.

Of the Lacertilians, of which no synopsis has hitherto appeared, there were fourteen in the Xantusian collections. Of these there were—

Confined to the Cape,	Also Sonoran,	Represented in Sonoran by—
Diplodactylus unctus *Cope*,	Uta stansburiana,	
Phyllodactylus xanti *C.*,	Dipsosaurus dorsalis.	
Uta nigricauda *C.*,		
" thalassina *C.*,		
Callisaurus dracontoides *Blv.*		C. ventralis *Hall.*,
Sceloporus zosteromus *C.*,		S. clarkii *B.*, *G.*
Phrynosoma coronatum. *Blv.*		
Ctenosaura hemilopha, *C.*,		
Cnemidophorus maximus, *C.*,		
" hyperythrus *C.*,		
Xantusia vigilis *Bd.*		
11 sp.	2 sp.	2 sp.

Gerrhonotus multicarinatus *Blv.*, one sp., belonging entirely to the Pacific district.

* In enumerating the Ophidian genera of Central America in the same connection, by a lapsus calami *Hydrodipsas* was written instead of *Hydromorphus* Peters, and not properly corrected. The former is really East Indian (Malaccan), and is the same as that previously named Cantoria by Girard,—a fact apparently not before noticed.

There were four species of Batrachia of the following range:

Peculiar to the Peninsula,	Hyla curta *Cope*, s. n.
Extending to Pacific district,	" regilla *B.*, *G.*
Extending to South Central,	Scaphiopus couchii, (var. varius *C*)
" " "	Bufo punctatus *B.*, *G.*

The relations of the Sonoran district fauna, then, to that of Cape St. Lucas, are as follows:

Total number Sonoran	68
Confined to it	45
Total number Cape St. Lucas	34
Confined to it	19
Common to the two	10
Cape St. Lucas sp. in South Central district	4
" " Pacific district	3

The only genus occurring at Cape St. Lucas which does not exist elsewhere in the Regio Nearctica, is Ctenosaura, which is Mexican.

Prof. Baird has regarded (Proc. Acad. 1859, 300) the Sonoran and Lower Californian provinces as identical, and has pointed out the slight affinity of the latter to the Pacific district. It appears from the preceding that, in respect to the reptiles, they constitute provinces nearly as distinct from each other as the Sonoran is from the Central, a conclusion agreeing with that attained by Dr. John L. LeConte from a study of the Coleoptera, (vid. Proc. Acad. 1861, 335). That these, and the Pacific province, are more nearly related to each other than to the Eastern province, is sufficiently apparent on general Herpetological and other grounds, as set forth in Prof. Baird's masterly review of the distribution of North American Birds, Silliman's Journ. Sci. and Arts, 1866.

Dr. Günther has indicated the Tropic of Cancer as the approximate division line between the Nearctic and Neotropical Regions; the writer (l. c. 1861, 306) has regarded this as the parallel of its eastern extremity, and placed the western several degrees further north. More recently Prof. Baird (l. c.) has indicated a less oblique division, raising the eastern extremity to the mouth of the Rio Grande, and terminating it on the west at Guaymas. While he characterizes the line as "arbitrary" for the birds, it is much less so for terrestrial vertebrates; in these the transition of faunæ is striking and quite abrupt.

Description of Hyla curta Cope, *supra*.

Form stout, size small, breadth of jaws entering total length two and two-third times. Males without gular vocal vesicle. Tongue nearly one-third free. Femur posteriorly unicolor; basal fold weak. A dark labial border and band from nostril to axilla, above ashy brown, with a dark interocular triangle and a broad dorso-lateral band on each side, often broken into elongate spots. Limbs punctulate and cross-barred.

Muzzle projecting beyond nares not very prominent; canthus rostralis well defined, straight, loreal region not concave. Eyes little prominent, diameter less than distance between origins of canthus rostralis, three times that of tympanum. Vomerine fascicles entirely between nares, choanæ small. Skin smooth to sparsely and finely tuberculate above. Digits stout, dilatations well defined except on the inner anterior; all the latter free, the posterior not elongate, webbed to base of second phalanx. Hind foot measures one and two-thirds width of head; the heel extended reaches anterior margin of orbit. The sacral diapophyses are slender, like those of H. pickeringii. Tarsal fold distinct, cuneiform process small; heel extended reaches anterior orbit.

The groin is sometimes mottled with black, and the sides often with brown,

or marbled, which may extend over the iliac region. Sometimes all the dark markings are marbled with paler. There is a band on the front of the humerus, and the hind limbs are frequently double-banded.

	Lines.
From end of muzzle to canthus oris	3·9
" " to vent	12
Length of fore limb	7·4
" hind "	18 4
" " foot	8·6
Interorbital breadth	1·8

Like capistrata, palliata, and the Eastern pickeringii, this is one of the smallest species of the genus; in form it is the most distantly removed from the typical forms, approaching distantly Chorophilus, which it resembles in color. The lack of a vocal vesicle, not rarely occurring in the genus Rana, I have not observed in any other species of this genus.

No. 5293, 19 specimens half ♂}, Cape St. Lucas. Jno. Xantus.

November 6th.

MR. VAUX, Vice-President, in the Chair.

Thirty three members present.

The following were offered for publication:

"Fifth contribution to the Herpetology of Tropical America." By Ed. D. Cope. "On the Habits of the Agricultural Ant of Texas." By Gideon C. Lincecum.

Dr. Hayden made some remarks in regard to an extensive chalk deposit on the Missouri river. He also exhibited to the Academy some fossils, fishes and shells, which had been taken from these chalk deposits by Mr. Geo. A. Propper, a resident of Yankton, the capital of Dakota Territory. This formation has been known for many years, and represents No. 3, or Niobrara group of the Cretaceous series of this region. It commences at a point on the Missouri river not far from Blackbird hill, overlapping, on the high hills, Nos. 1 and 2 of the Cretaceous series. Near the mouth of the Vermilion River it begins to occupy the country, to the exclusion of any other rocks, and passes beneath the bed of the Missouri near the Great Bend. It is thus visible for nearly 400 miles along the river. The fossils which have thus far been taken from this bed are not numerous in species. The *Ostrea congesta*, Conrad, is perhaps the most abundant shell. It is found in many localities aggregated in vast masses, reminding one much of the little raccoon oyster that is left by the receding of the tide along the shores of the sea islands of South Carolina.

Inoceramus problematicus is abundant between Blackbird hill and mouth of Big Sioux river. It is found in a grey, rather hard, chalk limestone, which forms the base of the formation No. 3, and the rock is used much by the settlers for building purposes and for burning into lime. *I. pseudomytiloides* and *I. cuneiformis* are found at different localities. This rock varies greatly in color as well as texture, from a lead grey to milk white. It is oftener a deep rust color, owing to the presence of the peroxide of iron. It resembles very much our common chalk of commerce, and might be used for similar economical purposes. Although the organic remains thus far found in this formation do not positively affirm it, yet there can be hardly a doubt that it is the American representative of the white chalk beds of Europe. The fish remains are many of them quite well preserved, and as they belong apparently to undescribed species, they are placed in the collections of the Academy for future study.

[Nov.

The deaths were announced of Mr. Francis A. Wolgamuth, a member, and of Dr. Robert W. Gibbes, of Columbia, S. C., correspondent. Also that of Mr. Robert Kennicott, correspondent, which occurred near Behring's Straits.

November 13th.

The President, DR. HAYS, in the Chair.

Thirty-five members present.

The following was offered for publication: "Description of the Hot Springs of Soda Creek, &c." By E. L. Berthoud.

Mr. Isaac Lea read the following letter:

New Garden, 5th of 9th mo., 1866.

ISAAC LEA.

Dear Friend,—As science is the accumulation of facts, and the legitimate inductions derived from them, I offer no further apology for this intrusion.

Our *Helicidæ* and other land shells generally pass the day in damp secluded places, among grass, under logs and fallen leaves, and even buried beneath the surface of the earth in dry weather, and are consequently difficult to find. From these retreats they sally forth during the night, enlivened by the falling dew—or still more by a shower of rain—in quest of food and pleasure. But here they are screened from observation by the darkness of the night.

Knowing their habits, and having often found them under boards or other dejected matter, it occurred to me several years ago to make this knowledge available in collecting such shells. My success has been most gratifying to myself—may it not prove equally so to others? The plan which I adopted is this: On a summer evening, after rain, I lay a *wet board* on the *wet grass* anywhere in my yard, lawn, or pasture, and on the following morning find the shells adhering to the under surface. In this way I have at various times obtained the following species in greater or less abundance:—

Succinea avara,	Vallonia minuta,
Hyalina indentata,	Bulimus marginatus,
arborea,	Leucocheila contracta,
Gastrodonta suppressa,	corticaria,
Strobila labyrinthica,	pentodon,
Anguispira alternata,	Isthmia ovata,
Patula striatella,	gouldii,
Helicodiscus lineata,	milium,
Pseudohyalina minuscula,	armifera.

Only a week ago, on removing a small log from my pasture, where it had lain some months, I accidentally detected a few shells of *Isthmia milium*, hitherto unnoticed in this vicinity. The next evening, after rain, I laid three boards, each four feet long and six inches wide, upon the spot, and the next morning obtained 250 *Ist. milium*, 15 *Leuc. pentodon*, 3 *Gast. suppressa*, and 6 *Pseud. minuscula*.

The plan here suggested is susceptible of extensive application to the purposes of the practical conchologist and travelling collector of shells, wherever they may chance to pass the night; especially so, as I have found by repeated trials that a bucket of water thrown on the grass and covered with a board affords all the conditions necessary for success about as well as a shower of rain. No cumbrous apparatus is required to load the traveller; the means will always be at hand wherever he may chance to lodge, and a few moments of the evening and morning will suffice to set his traps and bag the game.

The record of a journey across this wide continent, so conducted, would

probably exhibit the ever-changing mycological fauna of the country in a very different light from what it now appears. New species would no doubt be discovered, and the boundaries of the old ones more accurately determined.

Within the week I have obtained 366 *I. milium* in the locality mentioned, and after considerable search have found only a single shell in the whole field, more than four yards from the spot first designated; a singular instance of the extreme localization of a species which is quite numerous at that point.

Which is respectfully submitted by thy sincere friend,

E. MICHENER.

Dr. Hayden reported the discovery of a Mastodon tooth in the Post-pliocene drift near Fort Kearney, and another in the same formation in the bluffs opposite St. Louis.

E. D. Cope pointed out the anomalous relations existing between the tibia and fibula in certain of the Dinosauria, as illustrated by the genus Laelaps. He remarked: The distal extremity of the tibia is transverse, and much compressed, and does not exhibit any of the usual appearances of an articular surface, neither the reptilian condyle, nor a cotyloid cavity sufficient for an astragalus of the size necessary for an animal of such bulk. A bone, presenting a broad hour-glass-faced articular surface was discovered with the other remains, and had puzzled the anatomists who had seen it. This piece exhibits, along its whole posterior aspect, two faces, which form a reëntrant angle for a fixed articulation: this is found to have been applied to the extremity of the tibia, exactly, and to have been fixed by strong articular ligaments. The medially constricted condyle presenting forwards and a little downwards exhibits so little analogy with the artragalus, as to suggest other interpretations, and, after a careful examination, it seems evidently the distal extremity of the fibula. This element furnishes a small articular surface at the knee, and fitting the tibia by the concavity of its inner face, becomes greatly attenuated at its distal third, where it is, in consequence of an obliquity of its direction, applied to the anterior face of the former bone. It then spreads into a plate extending to the inner margin of the tibia, while the solid shank is continued along the outer margin, and both terminate in the massive condyle which embraces the whole extremity of the tibia, like an epiphysis.

One other example only of this structure is known in the Vertebrata, of which I only find mention in Cuvier, Ossemens Fossiles x., p. 204, tab. 249, fig. 34-5. This author studied the distal extremity of a tibia with applied fibular condyle, from Honfleur, which he was not able to assign to any known species or genus, but which he, with usual sagacity, includes in the chapter devoted to Megalosaurus.

He however regarded the face of the tibia receiving the condyle-bearing bone as the inner, instead of the anterior, stating that the tibia is laterally instead of antero-posteriorly compressed, so anomalous is this structure among vertebrates. He regarded the bone as the astragalus, and did not perceive any connection between its ascending apophysis and a fibula, partly because a fibula with distinct distal articulation was received with the same bones.

The fibular condyle possesses an articular facet on its exterior extremity, (anterior, Cuvier), probably adapted to a corresponding face of a calcaneum. Its plane is transverse and does not cover the whole extremity, the anterior margin and a knob on the antero-superior part of the extremity projecting beyond it. Exterior to the middle of the upper margin of this piece, and at the internal base of the ascending apophysis, it is perforate, as is the cavity above the condyles of the humerus in the higher apes, and may have received a similar coronoid process of an astragalus.

As compared with the species examined by Cuvier, this fibular condyle has a less elevated form; in Cuvier's specimen the ascending apophysis was flatter, broader and directed toward the calcaneal facet instead of from it; it lacked

the submedian perforation. Its tibial face appears to have been rounded, not angulate. The tibia presented an ascending ridge, to the face of which the ascending apophysis was applied; in the Laelaps aquilunguis there is no ridge, the apophysis reposing in a slight concavity. This apophysis, like the slender portion of the fibula, is composed of dense bone.

Cuvier describes at the same time a bone of which he says, "il ne serait pas impossible que l'os (fig. 39) fut la tete supérieur du péroné du pied que je viens de decrire." This piece has a shank compressed at right angles to the direction of its head, a form so unlike the fibulæ of known Dinosauria, including Megalosaurus and Laelaps, as to render its pertinence to the animal possessing the forementioned tibia, to say the least, very doubtful.

The direction of the condyle indicates the articulation of the tarsal elements to have been at a considerable angle with the shank of the leg, and that the animal was entirely plantigrade, and was unable to extend the foot in line with the lower leg. The animal's weight was no doubt shared by another tarsal bone, besides the astragalus, owing to the anterior position of the former.

In most known Dinosauria the relations of tibia and fibula are similar to those in the modern Lacertilia. It would appear then that this class existed under two ordinal modifications; the first, including Scelidosaurus Ow., Hylaeosaurus Mant., Iguanodon Mant., and Hadrosaurus Leidy, may be called the ORTHOPODA; the second including Laelaps Cope, and probably Megalosaurus Buckl., may be termed the GONIOPODA.

November 20th.

The President, DR. HAYS, in the Chair.

Thirty-seven members present.

The following was offered for publication: "Descriptions of some new species of Diurnal Lepidoptera." By Tryon Reakirt.

November 27th.

The President, DR. HAYS, in the Chair.

Forty-two members present.

On favorable report of the Committees the following were ordered to be published:

Fifth Contribution to the HERPETOLOGY of Tropical America.

BY E. D. COPE.

The following species, previously unknown to the scientific system, are selected from the collections made at different points in Mexico by the esteemed correspondents of the Smithsonian Institution, Drs. Arthur Schott, Francis Sumichrast, Berendt, and Major.

OPHIDIA.

Himantodes tenuissimus m. sp. nov.

Vertebral series of scales small, like the rest, altogether in seventeen rows. Head broad, very obtuse, prenasals approaching each other; loreal subquadrate; preorbitals 2 or 1, postorbitals narrow, two. Superior labials, eighth, fourth and fifth, sometimes third in orbit. Frontal anterior suture longer than lateral, which converge behind; length of shield three-fourths common suture of parietals; temporals 1 or 2—3.

Body exceedingly slender and compressed. Gastrosteges 250, anal divided, urosteges 157. Total length 2 feet 9 inches, tail 10·5 inches; length of head 5 lines.

Ashy white, with fifty transverse black light-edged spots on the body, which approach closely on the median line; on the tail 39 spots. Below, belly minutely punctulated; tail brown spotted.

The absence of the dorsal shields would indicate a wide separation of this species from the type of the genus H. cenchoa L., but for the existence of H. gemmistratus Cope, in which this series is much narrowed, approaching the ordinary form of scale.

Smithson., No 6563; Schott, No. 903. This, with the three species following, form part of the collection made by Dr. Schott under direction of Governor Ilarregin, of Yucatan.

Mesopeltis sanniolus m. genus et spec. nov.

Char. Gen.—Maxillary, palatine and pterygoid bones elevated laminiform, the first bearing slender teeth to opposite middle of orbit. Cephalic shields normal; posterior genials quite small, the first pair united into an ovoid shield which is in contact with the symphyseal. No scale pores. Anal divided. Body compressed, head quite distinct, with large eye and vertical pupil. Scales smooth, without larger vertebral series.

Char. Specif.—Muzzle contracted, labial margin and mandible especially so, from under the orbit. Rostral not visible from above; two short nasals; loreal narrow, erect; preoculars two, very narrow, the inferior very small. Vertical, nearly twice as long as broad at its middle; a little longer than parietal suture; its outlines straight. Superior labials eight—nine, the suborbitals the fourth and fifth, longitudinal. Inferior labials ten, the anterior four very small, the fifth narrow, oblique. Back and belly equally rounded; scales in fifteen series. Tail cylindrical. Gastrosteges 156; urosteges 55 (approximately).

Length of head and body 11 inches.

Above light brown, with one series of small dark brown spots on the median line separated by intervals nearly equal to their diameter. A broad nuchal band continued to middle of frontal shield. Lips and sides with numerous pale brown spots; under surfaces generally with minute brown punctulations.

Smithsonian No. 6564.

This is another of the Leptognath forms which occur in the tropics of both worlds, but most abundantly in the neotropical region. It is more distinct from Leptognathus D. B. than is Tropidodipsas Gthr.

Conophis concolor m. sp. nov.

The largest species of the genus: form stout, tail $4\frac{1}{3}$ times in total length. Scales in nineteen rows, broad. Frontal region and muzzle narrow elongate, anterior to frontal shield, equal length of latter, and considerably longer than occipitals. Rostral with a strong concentric groove below, nasals distinct, elongate; loreal longer than high, parallelogrammic; preorbitals not reaching frontals; postorbitals two, rather large. Superior labials eight, eye over fourth and fifth, penultimate higher than long, last nearly as elevated. One elongate inferior temporal, the superior subdivided, (in two specimens.) Inferior labials 10. Gastrosteges $166\frac{1}{1}$, urosteges 72. Color above pale yellowish brown; a brown band, from the end of the muzzle through the eye, is lost a short distance behind opposite the mouth, and on one of the specimens two incomplete dotted lines extend from the sides of the frontal, and, diverging, are lost on the nape. Superior labials and rostral margined with brown below. Under surfaces light yellow.

Total length 32 inches.

Two specimens (138).

This species furnishes a strong degree of sulcation of the elongate posterior maxillary teeth. The sulcus is deep, and its external margins approximated, though not closed, as in the fangs of Proteroglyphs. The tooth has an elevated trenchant ridge on its posterior aspect.

Coluber flavirufus m. sp. nov.

Intermediate in characters between C. triaspis Cope and C. emoryi Bd. Gird. Scales in twenty-seven series, all rather small, four median rows only slightly carinate. Frontal, vertical and prefrontal shields longer than broad, length of former equal to common suture of parietals. Orbitals 1—2, the anterior large, nearly reaching vertical; the single loreal obliquely truncate behind, nearly triangular. Labials nine, fourth, fifth and sixth margining orbit. Orbit large, its diameter equal distance from nares to its anterior border. Two or three narrow elongate temporals between labials and parietal, anteriorly declined and in contact with postoculars. Postgenеials very slender, separated by scales, nearly equal pregeneials; inferior labials 13. Tail slender, $4\frac{3}{5}$ times in total length. Length of a young individual 1 foot 10 inches.

Ground-color yellow, below unspotted, above marked with brick-red spots, broadly brown margined. There are from 40 to 47 of these to opposite vent, some of them divided and alternating, and a row of alternating spots on the sides; alternating with the latter an irregular series of still smaller markings. A longitudinal included yellow line on the nape; a similar brown mark on frontal plate, and transverse band on prefontals; other head markings few and broken, including a narrow line from orbit to canthus oris.

Smithsonian, No. 6566. Yucatan.

This species has been found also at Tabasco by Dr. Berendt, and sent to the Smithsonian Institution. This specimen has the orbit a little smaller, three instead of two oblique temporals, and 47 dorsal spots.

Bascanion suboculare sp. nov.

Gastrosteges 200, anal $\frac{1}{1}$, urosteges 111.

Scales in seventeen longitudinal rows, the two external larger, the median half their width. Tail three and five-sixths times in total length. Muzzle short, rostral plate little visible above. Orbit moderate; its longitudinal diameter equal transverse width of superciliary plate. Frontal plate narrow, sides concave, length equal from its anterior margin to end of muzzle, and greater than length of common occipital suture. Internasals of nearly equal diameters; prefrontals bent down on loreal region. Nasals large, loreal longitudinal; preoculars two, inferior minute, superior not reaching frontal, prolonged backwards over orbit, and with strong canthal ridge. Postoculars two; occipitals not emarginate behind. Superior labials seven, the fourth very large, supporting not only the orbit, but the pre- and postoculars; fifth subtriangular apex truncate by inferior temporal; sixth and seventh large and nearly equal, longitudinal. Temporals in a superior and inferior row of $\frac{3}{3}$, the upper extending to end of occipitals, the lower to last labial. Pregeneials little longer than broad, much shorter than postgeneials. Inferior labials nine, the fifth largest, the eighth longitudinal, narrow.

Length of head and body 64 in. 5 lin.; of tail 22 in. 6 lin.

Habitat.—Central Guatimala; specimen from between Coban and Cluseo. Henry Hague, Collector.

This large species belongs to the section of the genus characterized by two preocular plates which embraces B. constrictor Linn., B. flaviventris Say, B. vetustum Bd. Gird., and B. anthicum Cope. From all these it differs in the arrangement of the labial and temporal shields, and the greater number of abdominal and caudal scuta.

Scolecophis scytalinus sp. nov.

Scales in seventeen rows, each nearly as broad as long, the vertebral series larger than any other, but equal on anterior seventh of body. Head little distinct, obtuse, muzzle broad; frontal plate broad, anterior suture one-fourth longer than lateral or posterior, length greater than common suture of occipitals. Superciliary small, one narrow preocular, two subquadrate postoculars. Loreal subquadrate, nasals distinct; rostral slightly produced backwards above, internasals one-fourth size of prefrontals. Temporals 2—2 or 3 anterior long. Superior labials eight, first and second much separated by prenasal, fourth and fifth below orbit, seventh and eighth elongate. Inferior labials eight, two anterior in usual contact, postgeneials shorter than pregeneials. Gastrosteges 207, anal 1, urosteges 7, entire, 71 paired.

Total length 23 in., of tail 4 in. 9 lin.

Color above red, each scale tipped with blackish; a broad black collar, ten scales wide, not extending on the gastrosteges. Head yellow above, front of head black to postoculars and anterior part of occipitals, tipping chin.

Museum Smithsonian, No. 6581. Collected by Dr. Berendt near Tabasco, Mexico.

The genus was defined by the author in the Proceedings of Academy for 1861 to embrace S. atrocinctus D. B. and S. zonatus Hallowell, which differ from Tantilla in the presence of the loreal plate, and from Erythrolamprus in the entirety of the anal shield. The present discovery gives further evidence of the stability of this form. Rhadinæa annulata (Enicognathus Dum., Bibr.,) was procured by Dr. Berendt at the same place.

Tantilla calamarina sp. nov.

Scales in fifteen longitudinal rows, head flat, not distinguished; tail contained six and three-fifth times in the total length. Pre- and postorbitals one each, small; superior labials six, third and fourth bounding orbit, and pre- and postorbital scales. Superciliaries small. Prefrontals descending to contact with second labial; nasals large; internasals narrow; frontal longer than broad, angulated in front, occipitals elongate, embracing a scale in their emargination. Temporals 1—1, the anterior not in contact with the postocular. Inferior labials seven, fourth largest, the first widely separated from each other by contact of pregeneials and symphyseal; pregeneials longer than broad, postgeneials minute.

Length 7 in. 7 lin.; of tail 1 in. 1 l.

Color brown, end of muzzle yellow, lower surfaces and occipital region pale. Sides and top of head and three longitudinal bands blackish; the latter extend on the common line of the third and fourth, and on the vertebral series of scales.

Allied to the T. planiceps Blainville.

Museum Smithsonian, No. 6600; sent in a valuable collection from Guadalaxara, Mexico, by I. I. Major.

Typhlops basimaculatus sp. nov.

Preocular plate present, single, a little wider than ocular; nostril situate on a suture which extends to the rostral. Rostral narrow, not angulated nor prominent. Eye invisible, ocular plate extending to labials. Scales in eighteen longitudinal rows. Superior labials four. Body compressed behind, tail narrowed, obtuse, three-fourths transverse diameter of former. Head depressed, muzzle from above rounded truncate.

Color yellow, scales of seven dorsal rows with a large brown spot at base, which is visible through superjacent scales; pattern resulting, reticulate. Top of head and end of tail immaculate.

Total length 12 in. 3 l.; vertical diameter at posterior third, 3 lin.

Habitat.—Cordova and Orizaba, Mexico. Prof. Sumichrast says, it excavates galleries in the earth; is found more rarely under stones.

This species is nearest the T. coecatus Jan., which is found on the Gold Coast, West Africa.

Museum Smithsonian, No. 6602.

SAURIA.

Plistodon sumichrasti sp. nov.

No freno-nasal plate; scales of body in twenty-eight longitudinal rows, the laterals not oblique. Inner posterior toe shorter than the fourth. The limbs being extended, the anterior digits reach the base of the external posterior. Two extended transverse plates behind each parietal; exterior to the latter a large oblique temporal separated from labials by a trapezoid plate. Superior labials nine, eight much largest. Auricular meatus two-thirds eye slit. Four supraorbitals. Interparietal narrower than frontal, shorter than from anterior angle, latter to end muzzle acuminate anteriorly; frontonasals longitudinal, largely in contact, internasal transverse, well separated from rostral by supranasals. Prefrenal higher than long.

Grayish olive with an indistinct blackish band on each side commencing at the ear; top of head light yellowish brown; below pale. End of muzzle to vent 3 in. 7 lin.; to fore arm 1 in. 3 l.; length posterior limb 18·5 lines.

This species is allied to the P. marginatus Hallow., of Japan, and the P. fasciatus of the United States. It is the second species now known in Mexico; the other, P. lynxe Weigmann, is smaller, and in form and color like a Mabuia.

Museum Smithsonian, No. 6601. Orizava, F. Sumichrast.

Diploglossus chalybaeus sp. nov.

Thirty-four rows of scales on the body, those of the body rectangularly arranged, sixteen near the base of the tail; those of the tail with sixteen striæ, the median of which is raised so as to give an angulated appearance. Scales of the posterior part of the body with eight and nine striæ, those of the anterior regions smooth. Internasal broader than long, angulation front; frontal truncate anteriorly, convex and broader posteriorly; frontoparietals small, separated by their width. Interparietal nearly or quite as large as parietal, succeeded by a median plate. Five supraorbitals, marginals $\frac{3}{5}$; frenal and prefrenal touching; or frenonasal above postnasal. Limbs extended along the sides, separated by the length of the hind limb.

Length of larger specimens from end of muzzle to vent 3·5 in.; do. smaller specimen 2·5 in.; vent to end of tail of same 3·5 in.

Sides of head and body with limbs, black; sides of head and neck with some small greenish spots. Dorsal region for a width of seven and two half rows of scales olive brown, the edges of each row blackish and forming narrow imperfect lines; top of head spotless; below pale greenish.

Habitat.—Mountains of Orizava, Vera Cruz, at an elevation of from 4000 to 6000 feet; Prof. F. Sumichrast, Museum Smithsonian, No. 6603.

Gerrhonotus ophiurus sp. nov.

This species belongs to the subtype of the genus represented by G. tessellatus, but differs from the latter in the much longer tail and shorter limbs, and different arrangement of plates on the head, viz.:

Group I. Three pairs of supranasals, with azygus plate between first pair; scales $\frac{16}{12}$.

One preocular, two loreals, posterior canthal descending to labials. Legs separated by length of hind leg. Belly immaculate; tail shorter ..... ventralis.

Two præoculars, two loreals, posterior canthal descending to labials. Tail moderate; extended legs separated by length of fore arm; brown above with ten cross bands; belly black spotted ..... tessellatus.

Two præoculars, three loreals, not separated by the single posterior canthal; prenasal in contact with first labial. Tail 2·75 times head and body; extended limbs separated by length of humerus; red with ten light cross bands, v-shaped backwards; belly not black spotted..... ophiurus.

Three loreals, posterior canthal divided, each half corresponding to a loreal; prenasal separated from contact with first labial; tail twice head and body. Light olive with seven or eight dark cross bars; below yellowish marbled with olive.. infernalis.

The first species is *Pterogasterus ventralis* Peale and Green, Journal Academy, vi. 233.

The G. ophiurus is 13 inches in length.

Habitat.—Orizava, Mexico, Prof. F. Sumichrast.

Xenosaurus grandis Gray, *Cubina grandis* Gray, Ann. Magaz. Nat. Hist. xviii. 270. *Xenosaurus fasciatus* Peters, Monatsberichte Berlin Acad.

The genus Xenosaurus, first defined by the able Zoologist of the University of Berlin, is of much interest. Prof. Peters referred it with doubt to the Helodermidæ, and in my system of the Sauria,* I have followed his suggestion, not having had the opportunity of studying its skeleton. This having been afforded by the specimens sent to the Smithsonian Institution by F. Sumichrast, my conclusion regarding it is as follows: It is a Diplogloss in all points, presenting the anomaly of very strong inferior frontal crests, which fail of underarching the olfactory lobes of the brain, approaching in this respect equally the Gecconidæ and Varanidæ. The anterior limb of the mesosternum is shorter than in most of the Diploglossa. Parietal fontanelle distinct. The Xenosauridæ will stand in the system between the Gerrhonotidæ and Helodermidæ with the following diagnosis:

No premaxillary foramen, dentition strictly pleurodont, teeth with elongate cylindrical shanks attached on inside of alveolar parapet; head tubercularly scaled, temporal fossa not over-roofed by dermossification; mesosternum cruciform.

While the characters of the Helodermidæ are:

No premaxillary foramen; teeth with short dilated bases, obliquely anchylosed; head tubercularly scaled, temporal fossa overarched by dermoössification; mesosternum without lateral limbs, longitudinal.

The supraorbital ossification in Xenosaurus is a triangular piece over the anterior third of the orbit, attached to the prefrontal bone, not as in the other Diploglossa, continued to the postfrontal. The ball of the eye is defined by fourteen flexible sclerotic plates in front, whose contact is valvate except round the pupil, where each one dilates and overlaps the next, forming an imbricate circle.

Sceloporus heterurus sp. nov.

Four and five rows of supraorbitals besides the internal and external marginals. But little difference in size of dorsal, lateral and abdominal scales, the first with strong keel and mucro, not serrate, in 45 transverse rows between interscapular and sacral regions. Caudal scales much larger, with elevated keels continued as ridges, in eighteen longitudinal rows 8 lines beyond vent. Head scales smooth, the anterior frontal not divided; occipitals distinct. Some large marginal scales in front of auricular meatus. Femoral pores seventeen.

Color bright leek green with numerous delicate brown lines directed obliquely forward towards the back and there turning backwards; a narrow line ascending from arm to interscapular region receives a longitudinal one from orbit; a longitudinal line in front of thigh.

Total length 6 in.; from muzzle to vent 2 in. 6 l.

* Proceedings Academy, 1864, 228.

Museum Smithsonian, No. 6589. Received from Mirador, near Vera Cruz, from Dr. Charles Sartorius.

This species is near the Sc. grammicus Wiegmann, Herpetologia Mexicana, the type of which I consider to be sp. No. 641, Mus. Berolinense. In it there are but 38 rows of dorsal scales, three rows of supraorbitals, and no auricular marginal series.

BATRACHIA.

Lithodytes rhodopis sp. nov.

Near the L. griseus (Hallow.) of the same region, but of a more elongate form; the head narrower with smaller orbits and larger membranum tympani; toes more elongate, and with smaller dilatations; there are peculiar dorsal folds; the groin and femur are also not marbled as in the L. griseus.

Greatest breadth cranium one and two-fifth times between tympanum and end coccyx, equal between former and end of muzzle. Diameter of orbit equal from same to exterior nares, 1·5 times to equal longest or vertical diameter of tympanum (2 to 2·5 in L. griseus;) largest in young individuals. Vomerine series transverse, posterior well separated, not extending outside of line of interior margin of nares. Canthus rostralis well marked. A plica from posterior angle of eye extends to the anterior dorsal region nearly meeting its fellow; nearly opposite their termini a dorso lateral fold originates and passes to the line of the ilia; a third extends from over tympanum to near groin: generally minutely rugose above. Heel to considerably beyond muzzle. Sole and fourth digit, 1·3 to 1·5 width of cranium; metatarsals with series of small tubercles, and with a distinct inner cuneiform process; a slight web between proximal phalanges. Anterior digits without dilatations. End of forearm to end of muzzle. End muzzle to end coccyx 1 in. 7 lin. Same to posterior margin tympanum 7·5 lines. Hinder limb from end ilium to heel 1 in. 7·5 lin., foot 1 in. 4 lin.

Above dark gray, shaded with pink; a darker pale edged bar between ocular fissures, a longitudinal blotch of the same on top of muzzle; back with indistinct darker markings. Side of muzzle and head in spots on labial margin and cross-bands on limbs with sole of whole foot darker; a decurved black line from nostril over tympanum above humerus. Concealed faces of limbs and margin of mandible brown punctulate; below generally yellowish white. In another specimen there is no interorbital cross-bands, but two longitudinal stripes from muzzle to nape, and two from orbits converging on coccyx, and embracing a dark shade. Young, clay color with pink shades to rose color.

Habitat.—Vera Cruz, at Orizava and Cordova. Prof. Sumichrast's Collection.

Ont he Agricultural Ant of Texas. (MYRMICA MOLEFACIENS.)

BY GIDEON LINCECUM.

This is No. 2 of my catalogue—is inodorous, having no smell of formic acid. It is a large reddish brown ant, dwells in the ground, is a farmer, lives in communities, which are often very populous, and controlled by a perfect government; there are no idlers amongst them. They build paved cities, construct roads, and sustain a large military force.

When one of the young queens, or mother ants, comes to maturity, and has received the embraces of the male ant, who immediately dies, she goes out alone, selects a location and goes rapidly to work excavating a hole in the ground, digging and carrying out the dirt with her mouth. As soon as she has progressed far enough for her wings to strike against the sides of the hole, she deliberately cuts them off. She now, without further obstruction, continues to deepen the hole to the depth of 6 or 7 inches, when she widens the

bottom of it into a suitable cell for depositing her eggs and nurturing the young. She continues to labor out-doors and in, until she has raised to maturity 20 to 30 workers, when her labor ceases, and she remains in the cells, supplying the eggs for coming millions, and her kingdom has commenced. But very few of the thousands of mother ants that swarm out from the different kingdoms two or three times a year succeed in establishing a city. However, when one does succeed in rearing a sufficient number of workers to carry on the business, she entrusts the management of the national works to them, and is seen no more outside.

The workers all seem to understand the duties assigned to them, and will perform them or die in the effort.

The workers increase the concealment, which had been kept up by the mother ant during the period of her personal labors, of the passage, or gateway to their city, by dragging up and covering it with bits of stick, straw and the hard black pellets of earth, which are thrown up by the earth worms, until there is no way visible for them to enter; and the little litter is so ingeniously placed, that it has more the appearance of having been drifted together by the wind than to have been the work of design.

In about a year and a half, when the numbers of the community have greatly increased, and they feel able to sustain themselves among the surrounding nations, they throw off their concealment, clear away the grass, herbage and other litter to the distance of 3 or 4 feet around the entrance to their city, construct a pavement, organize an efficient police, and, thus established, proclaim themselves an independent city. The pavement, which is always kept very clean, consists of a pretty hard crust about half an inch thick, and is formed by selecting and laying such grits and particles of sand as will fit closely over the entire surface. This is the case in sandy soil, where they can procure coarse sand and grit for the purpose, but in the black prairie soil, where there is no sand, they construct the pavement by levelling and smoothing the surface and suffering it to bake in the sunshine, when it becomes very hard and firm. That both forms of these pavements are the work of a well planned design, there can be no doubt with the careful investigator. All the communities of this species select their homes in the open sunshine, and construct pavements. Their pavements are always circular and constructed pretty much on the same plan. During the ten years drouth that prevailed here, and which seemed very favorable to the increase of this species of ant, they suffered their pavements to remain flat, sometimes even basin-form. But the drouth could not continue always. The rain, which would be certain to drown the ants should it come upon their flat and basin-form pavements, would return again some day, and they seemed to know when this much dreaded event would occur. At least six months previous to the coming of the rain, they commenced, universally, building up mounds in the center of the pavements. To these mounds in the prairie they brought the little pellets of earth, thrown to the surface by the earth worms, and piled them up into a circular mound a foot or more in height. In sandy soil it is constructed of coarse sand, and in rocky situations they build it of gravel, and the pieces are so large, and the mound so high (18 inches to 2 feet, with a four feet base) that the beholder is overwhelmed with wonder. I know of one of these stone pyramids nearly 3 feet high and 5½ to 6 feet base, in which there are many little fragments of stone, some of them carried to the very top, any one of which would weigh more than 25 ants. Internally the ant mound contains many neatly constructed cells, the floors of which are horizontal; and into these cells the eggs, young ones, and their stores of grain are carried in time of rainy seasons.

The mound itself, and the surface of the ground around it, to the distance of four or five feet, sometimes more, from the center, is kept very clean, *like a pavement*. Everything that happens to be dropped upon the pavement is cut to pieces and carried away. The largest dropping from the cows will, in a short time, be removed. I have placed a large corn-stalk on the pavement,

and in the course of two or three days found it hollowed out to a mere shell; that too, in a short time, would be cut to pieces and carried off. Not a green thing is suffered to grow on the pavement, with the exception of a single species of grain-bearing grass, (Aristida stricta.) This the ant nurses and cultivates with great care; having it in a circle around and two or three feet from the center of the mound. It also clears away the weeds and other grasses all around outside of the circular row of Aristida, to the distance of one or two feet. The cultivated grass flourishes luxuriantly, producing a heavy crop of small, white, flinty grains, which, under the microscope, have the appearance of the rice of commerce. When it is ripe it is harvested by the workers, and carried, chaff and all, into the granary cells, where it is divested of the chaff, which is immediately taken out and thrown beyond the limits of the pavement always to the lee side. The clean grain is carefully stored away in dry cells. These cells are so constructed that water cannot reach them, except in long wet spells, when the earth becomes thoroughly saturated, and dissolves the cement with which the granary cells are made tight. This is a great calamity, and if rain continues a few days it will drown out the entire community. In cases, however, where it has continued long enough only to wet and swell their grain, as soon as a sunny day occurs they take it all out, and spreading it in a clean place, after it has sunned a day or two, or is fully dry, they take it in again, except the grains that are sprouted; these they invariably leave out. I have seen at least a quart of sprouted seeds left out at one place.

They also collect the grain from several other species of grass, as well as seed from many kinds of herbaceous plants. They like almost any kind of seeds—red pepper seeds seem to be a favorite with them.

In a barren rocky place in a wheat field, a few days after harvest, I saw quite a number of wheat grains scattered over the pavement of an ant city, and the laborers were still bringing it out. I found the wheat quite sound, but a little swelled. In the evening of the same day I passed there again; the wheat had dried, and they were busily engaged carrying it in again.

The species of grass they so carefully cultivate is a biennial. They sow it in time for the autumnal rains to bring it up. Accordingly, about the first of November, if the fall has been seasonable, a beautiful green row of the *ant rice*, about 4 inches wide, is seen springing up on the pavement, in a circle of 14 to 15 feet in circumference. In the vicinity of this circular row of grass they do not permit a single spire of any other grass or weed to remain a day; leaving the Aristida untouched until it is ripe, which occurs in June of the next year they gather the seeds and carry them into the granaries as before stated. There can be no doubt of the fact that this peculiar species of grass is intentionally planted, and, in farmer-like manner, carefully divested of all other grasses and weeds during the time of its growth, and that after it has matured, and the grain stored away, they cut away the dry stubble and remove it from the pavement, leaving it unencumbered until the ensuing autumn, when the same species of grass, and in the same circle, appears again, receiving the same agricultural care as did the previous crop; and so on, year after year, as I know to be the case on farms where there habitations are, during the summer season, protected from the depredations of cattle. Outside of the fields they sow the grass seeds, but the cows crop it down two or three times, when, finding that there is no chance to carry on their agricultural pursuits, they cut it all away and re-establish the clean pavement. Our cattle did not often crop the ant rice until their increased numbers have forced them to feed on all kinds of grass. That, however, has turned out favorably to the ant interest. For, while the prairies are being denuded of the stronger grasses, we have a delicate little biennial barley (Hordium pusillum) that is filling all the naked places. It rises from 3 to 6 inches, producing fine grain for ant consumption. It matures about the last days of April, and from that time all the agricultural ants are seen packing it home daily through the summer. This species of ant

subsists entirely on vegetable seeds. I have sometimes seen them drag a caterpillar or a crippled grasshopper into their hole, that had been thrown upon the pavement, but I have never observed them carrying any such things home that they had captured themselves. I do not think they eat much animal food.

I have often seen them have prisoners, always of their own species. I could not discover the nature of the offence that led to the arrestment; still I have no doubt as to the fact of its being so, and that the prisoner is very roughly forced along contrary to its inclination. There is never more than a single guard having charge of a prisoner, who by some means having obtained the advantage, and attacking from behind, had succeeded in seizing it with the mandibles over the smallest part of its back, and so long as it maintains this grip, it is out of the reach of harm from the prisoner.

In some cases the prisoner quietly submits, and folding up its legs, forces the captor to carry it along like a dead ant, as I thought it really was, until I caused its captor to drop it; when, to my surprise, it immediately sprang to its feet, and, running wildly, succeeded in making its escape. It occurs more frequently, however, that the prisoner does not give up so tamely, but continues to make every effort to rid itself of its detainer. I have many times observed the prisoner manifesting all the indications of terror and great reluctance at being so unceremoniously dragged along. It will lay hold of and cling to everything that comes in reach, and by this means greatly retard the progress of its captor. When at last they arrive on the city pavement, half a dozen or more of the national guard, who are always on duty, rush upon the prisoner, aiding the seemingly fatigued captor, who still maintains its potent grip upon the now almost helpless prisoner, seize it by the arms, legs, everywhere, and in a very rough manner hurry it down into the entrance to the city, and out of the reach of further observation.

The agricultural ant is very tenacious of life. I dissevered the head of one at 4 P. M. on Sunday, and the head remained alive, retaining sufficient strength by pressing with its antennæ against the slip of glass upon which it lay to move itself and change its position, until 10 A. M. the next day.

It seems to be an established law amongst all species of ants, and particularly with the species in question, that when any disaster occurs to their city, the first thing to be done is to take care of the young, and, if possible, secure their safety; and so, when by any accident one of their cities gets torn up, it will be seen that they universally rush to the nursery apartment; and every one that can, takes up an egg, the pupæ, the young in any stage of advancement, and will save its life or lose its own. As far as I can understand and read their actions, every one understands its duty, and will do it or lose its life. I have observed the guards, when a sudden shower of rain would come up, run to the entrance of the city, and there meeting with another party coming up from below, would crowd themselves together in the hole in such manner as to form a complete obstruction to the ingress of the water, and there remain overwhelmed with the accumulating rain until it ceased. If the shower continues over fifteen minutes, they are found to be still closely wedged in the aperture and all dead; and there they remain until the balance of the pavement guards, who during the shower had climbed some weed or blade of grass that grew near the border of the pavement, come down, and with some difficulty succeed in taking them out. They are immediately taken to some dry place on the pavement and exposed to the open air half an hour at least; after which, if they do not revive, they are taken off from the pavement, sometimes to the distance of sixty yards, and left on the ground without further care.

Long-continued rainy seasons, by deeply saturating the earth, will dissolve the cement of their cells, flood them, and drown the ants out entirely. I have allusion now only to the agricultural species of the genus. The first year after my arrival in Texas, I noticed that there were a great many uninhabited ant

hills, with pavements still smooth and nude of grass or weeds, indicating that they had been very recently occupied. The missing communities were all dead —extinct—had been destroyed by a series of rainy seasons. Then, there were but few of these ant cities to be found that were occupied. But when the drouth set in, the earth being no longer filled with water, they began to multiply very rapidly. City after city appeared as the dry weather continued, and now, 1863, at the close of a ten years' drouth, they have spread so extensively, that their clean little paved cities are to be seen every fifty or sixty yards, especially along the roadsides, in the prairies, walks in yards and fields, barren rocky places, &c. In beds of heavy grass, or weeds, or in deep shady woodlands, they very seldom locate a city. They prefer sunshine and a clear sky. This ant does not work in the heat of the day during hot weather, but makes up the lost time during the night. I have often found them busily engaged at 2 and even 3 o'clock, A. M. Before day, however, they call off the workers, and rest till about sunrise. In more favorable weather, when they can operate all day, they do not work late at night.

In regard to courage, there can be no mistake in stating, that when the interests of the nation are involved, this ant exhibits no signs of fear or dread of any consequences that may result to self, while engaged in the discharge of its duties.

The police or national guards of a community which has been established three or four years, number in the aggregate, of the parties on duty, from one to two hundred. These are seen all the time, in suitable weather, unceasingly promenading the environs of the city. If an observer takes his stand near the edge of the pavement, he will discover an instantaneous movement in the entire police corps, coming wave-like towards him. If the observer imprudently keeps his position, he will soon see numbers of them at his feet, and without the slightest degree of precaution, or the least hesitation, they climb up his boots, on his clothes, and as soon as they come to anything that they can bite or sting, whether it be boot, or cloth, or skin, they go right to work biting and stinging; and very often, if they get good hold on any soft texture, they will suffer themselves to be torn to pieces before they will relinquish it. If they succeed in getting to the bare skin, they inflict a painful wound, the irritation, swelling and soreness of which will not subside in twenty-four hours.

If any worm or small bug shall attempt to travel across their pavement, it is immediately arrested, and soon covered with the fearless warriors, who in a short time deprive it of life. Woe unto any luckless wight of a tumble-bug who may attempt to roll his spherical treasure upon that sacred and forbidden pavement. As soon as the dark, execrable globe of unholy material is discovered by the police to be rolling on, and contaminating the interdicted grounds, they rush with one accord upon the vile intruder, and instantly seizing him by every leg and foot, dispatch him in a short time. Sometimes the tumble-bug takes the alarm at the start, while only two or three of the ants have hold on it, expands its wings and flies off with them hanging to its legs. If it fails to make this early effort, it very soon falls a victim to the exasperated soldiery. The ball of filth is left on the pavement, sometimes in the very entrance to the city. In due time the workers take possession of it, cut it into fragments, and pack it off beyond the limits of the incorporated grounds.

I have not observed that anything preys to any considerable extent upon this species of ant. Chickens and mocking birds will sometimes pick up a few of them, but not often. If anything else in Texas eats them, I have not noticed it. Neither have I observed their nests bored into or dug up in middle Texas.

The agricultural ant is of but little disadvantage to the farmer, however numerous, as it is never seen six inches from the ground, nor does it cut or trouble any growing vegetable outside of its pavement, except the seeds of the noxious weeds and grasses. Sometimes it is found stealing corn meal, broom-corn seeds, &c.; but it is only when it finds them on the ground that it steals even these.

Children occasionally get on their pavement, and are badly stung. A few of these pavement lessons, however, generally obviate that inconvenience. The pain of their poison is more lasting, will swell and feel harder, than that of the honey bee. If they insert their stings on the feet or ankles of the child, the irritation will ascend to the glands of the inguinal region, producing tumours of a character quite painful, often exciting considerable fever in the general system; the irritation will last a day or two, but I have seen no permanent injury arising from it.

During protracted spells of dry weather, they are frequently found in great numbers in our wells. They seem to have gone there in pursuit of water, and not being able to get back, to make the best of a bad condition—in this unforeseen dilemma—they will collect and cling together in masses as large as an ordinary teacup, in which condition they are frequently caught and drawn up in the bucket. When they are thus brought up, though they may have been in the water a day or more, they are all living, though half drowned and barely able to move. While in the well they are all afloat, and at least one-half the mass submerged. As it is known that this species of ant cannot survive 15 minutes under water, how they manage when in a large half-sunken mass to survive a day, or even longer, is a question to which I may fail to give a satisfactory solution. I may, however, from experiments I have made with single individuals, in water, venture the assertion that there is no possible chance for the submerged portion of the globular mass, if it remain in the same condition in relation to the water, to survive even half an hour. Then we are forced to the supposition that by some means or other the ball must be caused to revolve as it floats. The globular mass must be kept rolling, and make a revolution every four *minutes*, or the submerged portion must die. To accomplish this somewhat astonishing life-preserving process, there is but one possible alternative. It can be effected only by a united and properly directed systematic motion of the disengaged limbs of the outer tier of ants, occupying the submerged half of the globular mass.

I saw to-day (June 15), in a clean-trodden path near my dwelling, quite a number of this species of ant engaged in deadly conflict. They were strewed along the path to the distance of 10 or 12 feet, fighting, most of them, in single combat. In some few cases, I noticed there would be two to one engaged, in all of which cases the struggle was soon ended. Their mode of warfare is decapitation, and in all cases where there were two to one engaged the work of cutting off the head was soon accomplished. There were already a number of heads and headless ants laying around, and there was a greater number of single pairs of the insatiate warriors grappling each other by the throat on the battle-field, some of whom seemed to be already dead, still clinging together by their throats. Among the single pairs in the deadly strife there were no cases of decapitation. They mutually grapple each other by the throat, and there cling until death ends the conflict, but does not separate them. I do not think that in single combat they possess the power to dissever the head; but they can grip the neck so firmly as to stop circulation, and hold on until death ensues without their unlocking the jaws even then.

The cause of this war was attributable to the settlement of a young queen in close proximity (not more than 20 feet) of a very populous community that had occupied that scope of territory for ten or twelve years. At first, and so long as they operated under concealment, the old community did not molest them; but when they threw off their mask, and commenced paving their city, the older occupants of that district of territory declared war against them and waged it to extermination. The war was declared by the old settlers, and the object was to drive out the new ones or exterminate them. But the warriors of this species of ant are not to be driven. Where they select a location for a home, nothing but annihilation can get them away. So, in the present case, the war continued two days and nights, and resulted in the total extermination of the intruding colony. From the vastly superior numbers of the older

settlers, though many of them were slain during the war, they nevertheless succeeded in destroying the entire colony, without any apparent disturbance or unusual excitement about the great city. Their national works and governmental affairs went on in their ordinary course, while the work of death was being accomplished by their resolute bands of triumphant warriors.

They do not interrupt, in any way that I have discovered, the small black erratic ant, when it comes on their pavement. They even permit the erratic ants to erect cities on any portion of the incorporated limits, and do not molest them. It may be that the little fellows serve them some purpose. But when they build too many of their confederate cities on the pavement of the agricultural ant, it seems to be an inconvenience to them some way, but they do not go to war with them, nor attempt to rid themselves of the inconvenience by any forcible means. They, however, do get clear of them, and that by instituting a regular system of deceptive and vexatious obstructions. The deception is manifested in the fact that it appears to have suddenly become necessary to raise the mound two or three inches higher, and also to widen the base considerably. Forthwith are seen swarming out upon the pavement hosts of ants, who go rapidly to work, and bringing the little black balls which are thrown up by the earthworms in great quantities everywhere in the prairie soil, they heap them up, first at the base of the mound, widening till all the near erratic ant cities are covered up. At the same time, they raise the entire pavement an inch or so, and in prosecuting this part of the national work deposit abundantly more balls upon and around the erratic ant cities than anywhere else. The little ants bore upwards through the hard sun-dried balls, which are constantly accumulating—getting worse every hour—until the obstruction has become so great that they can no longer keep their cities open; and, finding that there is no remedy for the growing difficulty, they peaceably evacuate the premises. There is found on almost every pavement, at this season of the year, three or four small pyramidal mounds, that have been constructed for the purpose of crowding out the little erratic ants.

The extensive, clean, smooth roads that are constructed by the agricultural ants are worthy of being noticed. At this season of the year their roads are plainest and in the best order, because it is harvest time, and their whole force is out collecting grain for winter supplies.

I am just this moment in from a survey of one of these roads, that I might be able to make an exact and correct statement of it. It is over a hundred yards in length, goes through twenty yards of thick weeds, underruns heavy beds of crop grass 60 yards, and then through the weeds growing in the locks of a heavy rail fence 20 yards more; and throughout the whole extent it is very smooth and even, varying from a straight line enough, perhaps, to lose 10 or 12 yards of the distance in travelling to the outer terminus. It is from 2 to 2½ inches wide; in some places, on account of insurmountable obstructions, it separates into two or three trails of an inch in width, coming together again after passing the obstruction. This is the main trunk, and it does not branch until it crosses the before-named fence, beyond which is a heavy bed of grain bearing weeds and grass. Their prospecting corps travel far out, and when they discover rich districts of their proper food they report it, and a corps of foragers are immediately dispatched to collect and bring it in.

27*th June*, 1863.—My son, Dr. Leonidas, called my attention to an assemblage of the males and females of the agricultural ants (Myrmica molefaciens) which took place about 2 P. M., and continued in session until 4 P. M. They were all winged ants, and there were many thousands, perhaps millions, of them, thickly covering the ground over an area of 107 yards in length and 10 wide. They came from all directions, and were evidently the production of many kingdoms of this wonderful species of ant. There must have been, at least, five males to one female, and all parties were rushing hither and thither over the entire area, described above, in a frantic, amative furor. Each female would be found covered and wallowing on the ground with clusters of from

four or five to twenty males; and there were hundreds thickly rushing over the ground in search of females that were not to be found. The air was full of them flying around, going off and returning; some of them, perhaps, just arriving.

When a female became satisfied with her numerous lovers, by a great and violent effort she made shift to extricate herself from their rude embrace and immediately fly away. After 4 P. M. they began rapidly to fly away, and in the course of an hour they were all gone, leaving their disconsolate, exhausted lovers, who made no effort to follow. Many of the males were already dead, and a still greater number lay helpless on the ground; but there were hundreds of thousands who were still active, and they collected together in the horse-tracks, cracks in the ground, and other places sheltered from the south wind, which prevails at that season of the year, and becoming perfectly quiet, were, at 6 P. M., lying still in heaps of from half a pint to a quart, sometimes more. At this hour I examined the entire field, and there must have been very near, if not quite, a bushel of the exhausted and dying male ants.

A strong south wind was blowing during the time the females were flying off, and the larger portion of them were drifted by the wind into the timbered lands to the north; many of them, however, succeeded in forcing their way a few hundred yards against the wind, and alighting, which seemed to be the effect of fatigue more than desire, they immediately, by writhing and doubling themselves in various ways, cast off their wings, which were no longer necessary, and running rapidly till they found a little clean spot of earth, went hurriedly to work digging holes in the ground, which they accomplished with apparent ease and considerable facility. They dig and bring out the dirt in considerable pellets with their large caliper-like mandibles, carrying it not exceeding two inches and dropping it in a circle around the hole they are making; very soon they had buried themselves out of sight. Two hours after they had commenced flying away from their lovers, hundreds of holes, with a little circle of black dirt around them, might be seen. In every clean-trodden piece of ground, and in the roads and paths, these new tenements were thickly set long before sundown.

Only one of these mother ants is necessary to start a kingdom. I saw no instance where two of them were at work at the same hole. In some favorable spot of ground there would be found a great many of them at work excavating their holes, sometimes within a foot of each other. None seemed to know that any other ant was near. While one was out with a load of dirt, I placed a stick in her hole; returning, she did not know the place, and in searching around soon found another one's hole, into which she immediately plunged. Very soon the owner of the establishment pushed the intruder out, who made battle as soon as they were fairly out on level ground. The conflict soon became desperate, and after they had fought for the space of a minute or two the intruder seemed to give way, and, extricating herself from her highly incensed antagonist, plunged into the hole again; the owner followed, and after some time succeeded in dragging the invader out once more, and also, after a dire conflict, in putting her to flight. The victor went to work again, but in the fight she had been injured, as I noticed every time she came out with a load of dirt she would stop awhile, and with one of her feet rub and fix something about her mouth. She seemed to be in pain, and did not work so vigorously as before the fight.

It would not do for many of these new queens to prove successful in building up kingdoms. There is some antagonistic action to prevent it. The male and female congress, I have attempted to describe above, happens two or three times every year, and should all the queens succeed in establishing colonies, they would in a very few years occupy the entire surface of the earth.

This species of ant—and I think it obtains with the whole genus, like the hornet, wasp, yellow jacket, &c.—do not go off from the old hive in swarms like the bee, but a single mother ant, after congress with the males, goes off alone and sets up for herself. She works very busily until she has raised 20 or 30 neuters

to work for her, when she ceases to labor, and, remaining in-doors, lays all the eggs that produce the coming millions. The laborers are long-lived, so are the queens.

28*th*.—I extract from my journal: This morning I found the males where I left them last evening. The greater portion of them were still active, and seemed to be quite careless as to their fate. Hundreds were dead or dying. Great numbers had climbed up the little weeds, many of whom were dead, but still clinging by their jaws, which were fast gripped to some little leaf or twig. The females had buried themselves by the time it was dark last night, and, closing up their holes, remained shut in all night. But few of them had opened their doors and gone to work at an hour by sun this morning. The number of their holes is truly wonderful. I saw many places where there were at least fifty of their holes to the square rod, and northwardly they extended for miles. When these mother ants succeed in boring their holes to the depth of six or seven inches they close them up, and employ themselves widening the bottom of them a little, forming small cells for the purpose, as I suppose, of making room for the deposition of their eggs. They do not, as I can discover, need any food yet. At 5 P. M. of this day I visited the place again, and found the male ants all dead. They were drifted into the gullies by the winds into heaps, and thousands of them besides lay scattered over the ground. Some of the females were still engaged deepening their holes, and their little piles of black dirt were to be seen everywhere.

29*th July*.—A month has passed. I went round to-day and found that, in all those thousands of female ants, who made so brave a start excavating new homes, there was but one that was a success, and it was concealed with a little pile of trash. There may be more, but I did not find them, and the winds have swept away their little piles of dirt, so that there are no signs of them left. From some cause they are all gone. Eight or ten days after they had shut up their holes I dug up quite a number of them; found them looking well, but they had no eggs or anything else in the little cell. They seemed to be sleeping.

I have never witnessed similar assemblages in any other species of ant, though I have seen it often take place with the agricultural species.

Long Point, Texas, Oct., 1866.

Descriptions of some new species of Diurnal LEPIDOPTERA.

Series II.

BY TRYON REAKIRT.

26. Neonympha lupita, nov. sp.

Female. Upper surface uniform dull brown, with a narrow, double, darker brown, marginal line.

Underneath paler; three narrow terminal lines on both wings, of which the interior is the broadest, and most clearly defined; a minute black ocellus near the apex of the primaries, ringed with pale brown; three transverse brown stripes on the same, between the middle and base; two extending from the costa to the inner margin, while the third and central one stretches over only one-third this distance.

Secondaries with three submarginal ocelli, black, encircled with yellowish brown, one near their apex, and the others close together, above the anal angle; three indistinct transverse lines above the middle, with several shorter ones towards the base. Expanse 1·25 inches.

Body of the same dull tint; antennæ ferruginous.

Hab.—"Mexico, near Vera Cruz." Wm. H. Edwards.
Orizaba. (Coll. Tryon Reakirt.)

27. Papilio asterioides, nov. sp.

Male. Upper surface black, marked nearly as in *Asterius;* the inner yellow

macular row upon the fore wings is almost obsolete, except the spot upon the inner margin, which is prolonged into a dash.

Hind wings marked as in *Asterius* ♀, but the blue clouds between the yellow bands are reduced to small rounded patches, insensibly diminishing to the outer angle; that upon the abdominal margin is lunulate and covers a fulvous crescent, not ocellate as in *Asterius:* tail not so long as in that species; emarginations white; expanse 3·5—4 inches.

Below much paler; primaries with a series of submarginal rounded yellow spots, and between these and the cell another of large fulvous sagittiform spots; a minute yellow spot on the end of the cell; one, somewhat larger, above the origin of the fourth subcostal veinlet.

Secondaries as in *Asterius*, with the exception of the anal mark, which is simply a lunule as on the upper surface, and of the existence of a very minute fulvous spot within the cell, rarely obsolete, always much less than the corresponding one in *Asterius;* the yellow emarginations are also considerably narrower than in that form.

Hab.—Mexico. Coll. Entom. Society.

A very remarkable approximation to our most common species of Papilio, and indeed the general similarity existing in color and form has been almost sufficient to induce me to regard it as only a singular aberration, or a well marked local race.

Upon a closer and structural examination, however, we discover the following points of difference in this most essential particular.

First, the antennæ of *Asterius* are fully a line longer than in the new type; secondly, the fourth subcostal veinlet is thrown off one-third nearer the cell than in our endemic species; thirdly, in it the cell is broader than in the corresponding ♂, and the disco-cellular veins of equal length; fourthly, upon the secondaries the upper disco-cellular does not form so great an angle with the second subcostal, and the intervals between the median veinlets are larger, consequently the cell is both broader and longer.

This adds a fourth member to that group of segregated forms, ranging over the largest portion of central and southern North America, and consisting heretofore of *Asterius*, *Aristor*, and *Indra*.

Mr. Wm. H. Edwards is in possession of a beautiful new species from Arizona, belonging to the same series, which I hope he will soon describe.

28. Lycæna isola, nov. sp.

Upper surface brownish black, glossed with violet blue; a black terminal line, broadest at the apex of the fore wings, thence diminishing to the anal angle; a small rounded, submarginal black spot near the latter; fringe white.

Underneath dark ash grey: primaries with two submarginal, slightly waved whitish lines; interior to these a row of six large rounded black spots, all ringed with white; two white streaks at the end of the cell.

Secondaries with a submarginal row of indistinct brown spots, of which the three nearest the anal angle are black, the first and third irrorated with metallic golden-green atoms, and the third surmounted by a yellowish lunule; all the others are preceded by whitish crescents; above these there is a suffused white belt, and still farther, two double rows of waved and crenulated whitish lines; a small subcostal black ocellus near the base.

A narrow terminal black line edges the outer margin of the four wings; fringe ashy white. Expanse ·88 inches.

Antennæ black ringed with white.

Hab.—"Mexico (near Vera Cruz)." Wm. H. Edwards.

29. Thecla Xami, nov. sp.

Male. Upper surface drab brown tinged with olivaceous, costa and outer margin of primaries broadly margined with blackish-brown.

Secondaries with a narrow terminal line, edged interiorly, at the anal angle, with a short white line; two tails, the outer short, and tipped with white, the inner one three times the length of the outer, and fringed exteriorly with white. Fringe brown.

Under side reddish brown, suffused with greenish and olivaceous, especially on the apical area of the fore wings and over the whole hind wings. A transverse white line, bordered interiorly by a ferruginous streak, runs from the outer third of the primaries' costa, nearly parallel with the outer edge, to the abdominal margin. Secondaries with a terminal white line, and a small black anal patch; the lower part of the area enclosed between those two white lines is strewn with violaceous ash-white atoms, and there are two prolongations of the inner white line, respectively down the first and second median veinlets, usually uniting with the ashy space below. Posterior to this line there are three oblong black spots encircled with white, and following the central of these a larger violaceous brown patch. Expanse 1·12 inches. Antennæ black, annulated with white, club ferruginous.

Female. Upper surface reddish ochreous; the black margins are much broader than in the *male*. Underneath the surface is more greenish; expanse 1·25 inches.

Hab.—"Mexico (near Vera Cruz)." Wm. H. Edwards.

30. THECLA ZOE, nov. sp.

Male. Upper side brilliant, shining blue, a black border of moderate width on the primaries, broadest at the apex; narrower upon the secondaries, which have two tails, the inner being the longest and tipped with white; there is the usual smooth sexual spot at the end of the fore-wings' cell, and obliquely below, and connected with it a large black patch.

Underneath brown tinged with purplish; on the primaries a submarginal band of obsolete dashes and a sinuated median row of six black spots extending from the costa to the first median veinlet.

Secondaries with three transverse bands and lines; the first is composed of interrupted black spots and dashes, bordered posteriorly with pale silvery-blue; the second is a waved black line, above which is super-imposed a broad stripe of silvery-blue atoms, and the third is marginal and silvery blue; there is besides a large black anal patch, and a small black spot above and midway between the two tails, surmounted by a reddish crescent; also a large rounded black dot above the cell. Fringe brown; expanse 1·4 inches.

Body above glossed with lustrous blue; underneath, brown, abdomen yellowish.

Hab.—"Mexico (near Vera Cruz)." W. H. Edwards.

31. THECLA BARAJO, nov. sp.

Female. Upper side shining greenish blue; costa of primaries, and a very broad outer belt, black; secondaries with a broad brownish-black outer margin, cut by a narrow, submarginal, white line; two tails, the fringe from the apex of the primaries to the lower of these, white; this has the anterior side fringed with black, and the posterior with white; hence to the anal angle the fringe is black.

Underneath light brown; the fore wings crossed between the middle and apex by four transverse white stripes, of which the first runs parallel with and close to the outer margin; the second starts near the apex, and in common with the other two, rising respectively at three-fourths and one-half the length of the costa, converges towards the inner angle; a short line running above the submedian vein unites the three; the third is bent very abruptly immediately before this junction.

Secondaries have two submarginal white lines, united at the outer angle and on the second and first median nervules; the upper one, in the space included between these two veinlets, is replaced by a black line surmounted

by a fulvous lunule; the lower half of the inner line is bordered interiorly by a narrow black line, and the enclosed spaces and outer margin below the upper tail are filled with black patches; there are four white lines, two from the costa, one from the base, and one from the inner margin, all converging towards and uniting above the fulvous lune; the first and last are edged posteriorly by a narrow black line, and the third and fourth are broadly interrupted by the submedian vein. Expanse 1·5 inches.

Body above glossed with greenish blue, beneath brownish; antennæ black with white annulations.

Hab.—"Mexico (near Vera Cruz)." Wm. H. Edwards.

32. NISONIADES MEJICANUS, nov. sp.

Upper side brownish black, a submarginal row of pale brownish spots on both wings; on the primaries an interior tortuous row of nine spots, of which the first five are pure white and well defined, the others are sometimes obsolete; a white discal spot.

Underneath paler, glossed with purple at the base of the primaries; their apex and the secondaries shining olivaceous brown; a row of five white spots runs from the costa of the primaries, and a white discal spot; the veins of the secondaries are prominently outlined in dark velvety brown; expanse 1 inch. Fringe brown.

Body and antennæ as in *N. Catullus*.

Hab.—"Mexico (near Vera Cruz)." W. H. Edwards.

A neotropical representative of our own *Catullus*. There are, in my collection, several new and allied South American forms, which replace this species upon the Amazons, and further southward; they will be described hereafter.

33. PYRGUS MONTIVAGUS, nov. sp.

Upper side dark olive brown; primaries—a marginal row of minute white spots, sometimes obsolete, followed by a submarginal series of larger ones; an irregular transverse, maculate band, composed thus: three oblong dashes from the costa, preceded by a small dot, then three rounded or subquadrate and smaller spots, and following, two large subquadrate patches, the last usually presenting a brown indentation on the outer side; a large quadrangular discal spot, between which and the third, fourth and fifth of the transverse band, are a small dot, and two narrow streaks; above the discal spot are one or two small dashes, and below it two conical spots; the outer half of the costa has four or five linear spaces upon it.

Hind wings with a marginal and submarginal row of rounded spots, and a mesial band of five or six oblong bars; all the markings of the upper surface are white. Fringe white, cut with black at the end of the nervures.

Under surface primaries have the markings of the upper side, repeated and enlarged; ground color pale olive brown.

Secondaries pale olive brown, lighter towards the base; a curved black line on the projecting shoulder, terminating in an enlarged knob; two transverse white maculate bands; one near the base of three spots, edged posteriorly with brown lines, the other is mesial, of irregular outline, and bordered with black lines on both sides; a submarginal and a marginal series of white lunes, surmounted by darker lines; abdominal area white, with a dark marginal line and projecting shadow at the anal angle. Expanse 1·20 inches.

Hab.—Rocky Mountains, Colorado Territory. (Coll. Tryon Reakirt.) "Mexico, near Vera Cruz." Wm. H. Edwards.

Most probably an alpine modification of the common *Pyrgus oileus*.

34. PYRGUS MACAIRA, nov. sp.

Male. Upper surface pearly-white, apex of primaries strewn with dark brown atoms, with indistinct traces of an interior submarginal line; base of

both wings heavily powdered with radiating black atoms; excepting this, the secondaries are immaculate; fringe brown, darkest on the primaries.

Underneath the primaries have a trapezoidal brownish space at their apex, behind which there is a transverse band, widening upon either margin. Secondaries have a very broad dark griseous-brown terminal band, commencing just before the apex, and ending at the submedian nervure; there is also a triangular baseo-costal patch, divided into three parts by white lines, the two outer are sometimes coalescent, and an oblong bar extending down the submedian vein, seemingly composed of three sections, of which the basal is linear; the second and largest, and the third, somewhat less, are rounded, quadrangular and triangular in different individuals; the interior portion of the wing—the area contained within these markings—is obscured with dusky atoms; the abdominal margin is aligned with brownish griseous.

Body above brownish black, beneath whitish; antennæ above dark brown, incompletely annulated with white, underneath paler, club ferruginous; alar expanse 1—1·15 inches.

Female. Pearly white; fore wings pearly white; a brownish black space at the apex, interior to this, two transverse bands; and a submarginal row of connected lunulæ, all of the same color. Hind wings with a narrow terminal black line, and a submarginal lunulate band usually reduced to two lunules on the middle of the outer margin, sometimes, though rarely, complete; short black lines run up the veins from the outer margin; fringe brown upon the fore-wings, soiled white upon the hind wings.

Underneath as in the male, the fore wing markings much plainer; those upon the secondaries very indistinct, and the terminal border is considerably widened; body and antennæ the same; alar expanse 1·37—1·45 inches.

Hab.—"Mexico, (near Vera Cruz)." Wm. H. Edwards.
Orizaba. (Coll. Tryon Reakirt.)

35. CARCHARODUS MAZANS.

Upper surface purplish brown, strewn with grayish white points; three transverse dark brown bands extending from the primaries' costa to the abdominal margin of the secondaries; the first is at two-fifths the length of the wings; the second and broadest at four-fifths, and the third is terminal. Interior to the second are three small white spots; two, close together, are near the costa, the other slightly below the middle; fringe brown; wings strongly scalloped and indented; expanse 1 inch.

Underneath brown; the markings reproduced very indistinctly; body and antennæ brown.

Hab.—"Mexico, (near Vera Cruz)." Wm. H. Edwards.

36. ERESIA SYDRA, nov. sp.

Wings of the shape of *E. Otanes*, Hewits. Upper surface dark brown; base of both wings reticulated with indistinct rufous lines; three incomplete rufous lunulate lines extending a short distance only from the inner margin of the secondaries; on the primaries a small yellowish white spot near to and above the middle of the outer margin, between which and the inner angle there are two indistinct rufous yellow spots; expanse 1·25 inches.

Underneath dull umber-brown, with a purplish brown border on the outer margin; the spots of the upper side reproduced, and dark brown waved lines towards the base. Secondaries paler, shaded with grayish purple and purplish brown; several waved lines toward the outer margin, above which a series of indistinct ocelli, followed by a row of connected lunulæ, between which and the base are numerous zigzag and curved lines; there are but slight chromatic variations over the surface; prominent shadings only on the costa, near the apical angle and along the outer margin.

Hab.—"Mexico, (near Vera Cruz)." Wm. H. Edwards.

Related to *E. otanes*, Hewitson.

37. PIERIS LENORIS, nov. sp.

Male. Upper surface sulphur yellow, a narrow black line at the apex of the primaries.

Underneath the secondaries and apical portion of the primaries vivid orange ochreous; posterior portion of the primaries as above. On the hind wings there are two grayish black spots on the costa, and another below the cell at the exsertion of the first median veinlet. Wings shaped as in *Pi. Margarita;* expanse 2·35 inches.

Hab.—"Mexico, (near Vera Cruz)." Wm. H. Edwards.

Allied to *Pi. isandra*, Boisd.

38. PIERIS PASION, nov. sp.

Upper surface chalky-white, immaculate.

Under surface: fore-wings' apical area and hind wings suffused with pale creamy ochraceous, otherwise as above; upon the secondaries are four narrow transverse greenish-gray lines; two respectively running from the upper thirds of the first and second subcostal veinlets to the costa; the third starts at the upper fourth of the submedian vein, bounds the lower portion of the cell, is discontinued in the lower, and reappears in the upper disco-cellular interspace; the fourth, between the last and the margin, is composed of two connected segments, rarely with a part of a third, all being contained within the median interspaces; the nervules here and upon the apex of the primaries are outlined in the same color; expanse 2·25—2·40 inches.

Hab.—"Mexico, (near Vera Cruz.")" Wm. H. Edwards.

The ornamentation of the under side approaches very nearly to some species of *Hesperocharis*.

39. SYNCHLOË ARDEMA, nov. sp.

Female. Upper surface black; fore wings with a waved row of seven spots across the apical half of the wing, an abbreviated row of four white spots within these, running down from the costa, and an isolated spot, opposite the fifth of the first row, between it and the outer margin, all white; two pale luteous spots in the middle and lower median interspaces. Hind wings black, rarely with an indistinct orange brown shade across the disc; fringe black, spotted with white.

Underneath: fore wings the same, with the enlargement of the white spots, the addition of two submarginal lunes, of two spots within the cell, and of an orange tawny streak at the base of the costa. Hind wings with a sub-basal band of four spots; a narrow mesial band extending from the costa to the submedian vein, and a marginal series of lunes, all ochreous; intermediate between these last a series of six rounded white spots; a tawny orange spot near the anal angle; expanse 1·87 inches.

Body and antennæ black, the latter annulated with white; palpi streaked with whitish; legs tawny orange.

Hab.—"Mexico, (near Vera Cruz)." Wm. H. Edwards.

I regard both this and the *S. tellias*, of Bates, as local modifications of *S. lacinia*, Hübner.

40, NEONYMPHA XICAQUE, nov. sp.

Upper surface pale brown; fore wings with a broad dark brown terminal border; two narrow transverse waved and angulated lines, one extending across the wing just beyond the cell, the other contained within the cell; in the upper portion of the area, enclosed between the first and the marginal band, there are two rounded black spots, of which the anterior is the largest.

Hind wings with two mesial, strongly angulated red-brown lines, of which the portion of the upper one nearest the abdominal margin is usually obsolete; following these is a series of six rounded black spots, of which the first and third are the least, and the second is sometimes prolonged posteriorly, the sixth is usually wanting; the margin presents three continuous red-brown

lines, obscured by a darker shade towards the apex; of these the two outer conform in outline with the indentations of the margin, the interior presents a lengthened arc from the abdominal margin to the third median veinlet, between which and the costa it is thrown into three shorter curves.

Fringe brown and white alternately; expanse 1·75 inches.

Underneath pale brown, darker towards the base, suffused with fuscous; two continuous broad red-brown lines extend from the subcostal vein of the fore to the abdominal margin of the hind wings; following these are two ocelli upon the first, and six upon the latter, all black, pupilled with white, and surrounded by reddish brown rings; of these the first upon the primaries is much the largest, the second upon the same, and the third upon the secondaries, minute and rather indistinct, the two apical ones of the latter closely approximating, and their other three at equal distances apart—all these five of nearly the same size: the border of the primaries is replaced by three narrow lines, and those upon the secondaries remain as on the upper surface; the area enclosed between the inner mesial line, and the base is, upon the secondaries, much darker than the rest of the surface.

Body brown; antennæ brown with incomplete pale annulations; club whitish beneath.

Hab.—"Mexico, (near Vera Cruz.)" Wm. H. Edwards.

More nearly allied to *N. canthus*, L., than any other of its congeneric associates, but still very distinct.

41. THECLA JALAN, nov. sp.

Female. Upper surface white glossed with black; a dark olive brown shade occupying the apical area and extending along the costal and outer margins of the primaries.

Secondaries bordered with a narrow black line, preceded by a white one as far as the submedian vein; interior to this a broad olive brown band, running from the costa down to the second median vein, thence to the margin bright orange, containing a small black spot in the first interspace, and also on the anal lobe, upon which there are some violet atoms; two black tails of equal length, the uppermost being tipped with white.

Underneath pure white; on the primaries four broad transverse olive brown bands, including the marginal, all tapering towards their inner margin; a pale orange spot at their base.

Secondaries with seven convergent and tapering bands, six of which unite in a waved black line that covers the large orange anal spot; this contains three black spots, of which the one at the anal angle is much the largest, and surmounted by a white ray.

Body blackish above, yellowish white beneath; head with an orange frontlet; first and second articles of the palpi white, the third black; antennæ black; expanse 1·45 inches.

Hab.—"Mexico, near Vera Cruz." Wm. H. Edwards.

42. GONILOBA POYAS, nov. sp.

Male. Upper surface dark olive brown, with long greenish hairs on the abdominal margin, and covering the body. Fore wings with a large tri-partite orange-ochreous spot about the end of the cell, interior to, and obliquely below which, there is an oblong sexual spot, of closely appressed grayish white scales.

Secondaries immaculate; a bright yellow fringe extends from the costa to the first median vein; for the remaining distance the ciliæ are brown.

Underneath, apex of primaries tinged with purplish, the sexual mark is wanting, but there is a bright yellow spot connecting the upper ochreous one with the costa. Secondaries underneath, as above, save that the yellow color of the fringe extends slightly over the edge of the wing.

Wings shaped as in *G. tityrus*, Fab., but the anal lobe is more obtused; expanse 1·75—2 inches.

Body brown, clothed with long hairs; anus encircled with long, bright yellow hairs; legs reddish; antennæ black, under side of club bright yellow.

Hab.—Brazil. (Coll. Tryon Reakirt.) "Mexico, near Vera Cruz." Wm. H. Edwards.

43. THECLA CESTRI, nov. sp.

Male. Upper surface brown, glossed with slaty-blue around the body; a large velvety-black sexual mark on the primaries, and two, rarely three, smaller black spots on the outer margin of the secondaries towards the anal angle; each of these is preceded by a bluish gray ray; there is also a narrow terminal black line. Fringe of the primaries brown and white alternately; that of the secondaries white in the middle, and brown at either angle.

Expanse 1—1·13 inches; margin of fore wings sinuated; of the hind wings rounded, and slightly lobed at the anal angle.

Underneath: primaries dull brownish-olivaceous, tinged with yellowish, basally; a sinuated transverse row of six brown or black lunes runs down from the costa, midway between the cell and the outer margin, beyond these the space is occupied with gray shades, containing a marginal row of oblong brownish dashes, of which the nearest to the inner angle is most distinct.

Secondaries grayish, transversed by numerous waved and lunulate lines and rows of spots; a subbasal row of five extending to both margins, of which the first four are orbicular, and the fifth lunulate; of these the second from the costa is the largest; a mesial series likewise stretching to both, and diminishing towards the abdominal margin; both of these rows are yellowish-brown, edged posteriorly with blackish curved lines; from the upper middle of the central one, a diffused shade of the same color extends towards the outer margin; on the upper angle there is a large lune, followed by several smaller ones, and towards the anal angle the two or three black spots of the upper surface are reproduced.

Body brown above, clothed with long slaty-blue hairs, whitish beneath; antennæ annulated with black and white; club black, tipped with yellowish brown.

Female. The lower half of the secondaries above is bluish gray, containing three marginal black spots, and underneath the markings are reduced in size and become paler. Expanse ·95 inches.

Hab.—"Mexico, near Vera Cruz." Wm. H. Edwards.

44. THECLA JUICHA, nov. sp.

Female. Upper surface brownish black, glossed with bluish gray on the posterior portions of both wings, but slightly upon the primaries, largely so on the secondaries; a narrow terminal black line edges the outer margin of the latter, preceded interiorly by a pale bluish white line; a single tail, long, black tipped with white. Fringe of primaries orange brown; of the secondaries yellowish-ochreous as far as the tail, afterwards bluish gray. Expanse 1·25 inches.

Underneath: primaries brownish gray, suffused with purplish at the base and towards the apex; a short narrow discal arc, an oblong curved bar between it and the base, an irregular curved broad band beyond the discal arc, and a submarginal series of lunulæ, all dark brown; the second and last of these are edged with white interiorly, the third exteriorly, and the discal curve on both sides; the outer margin presents a large ochreous patch.

Secondaries, costa and posterior portions purplish gray, the remainder pale ochrey-yellow; four transverse lines, all dark ochrey-brown on the anterior half, and olive brown or black edged with white on the posterior half of the wings; the first and third are most distinct, these and the fourth extend from margin to margin, while the second is simply a discal curve; some shining orange brown atoms occupy the anal angle.

Body black above, clothed with bluish gray hairs, yellowish-white beneath;

the tibiæ and tarsi are incompletely annulated with black and white alternately, but in sections of unequal value.

Hab.—"Mexico, near Vera Cruz." Wm. H. Edwards.

45. THECLA YOJOA, nov. sp.

Female. Upper surface, brownish, bluish gray on the hind portion of the secondaries; these are margined by a narrow black terminal line, above which towards the anal angle are four rounded black spots of which the third is the largest, and surmounted by a yellow crescent; a long tail proceeds from the extremity of the first median veinlet.

Under surface pale brownish-gray; a transverse, nearly straight line runs across the primaries from the costa to the first median veinlet, midway between the cell and the outer margin; the area beyond this is irrorated with whitish, upon which is superimposed a double row of marginal spots; also a white discal streak. Secondaries with a similar transverse line and discal arc, the first broken into three portions, each of which forms an almost right line; the upper is equal to the other two combined, and which are obliquely below and interior to it, as is also the lower to the middle one; an indistinct series of marginal ocelli, covered by a continuous row of lunulæ,—the first and third from the anal angle are dark brown, and surmounted by a yellowish lune. Expanse 1·13 inches.

Antennæ ringed with black and white; club tipped with ferruginous.

Hab.—"Mexico, near Vera Cruz." Wm. H. Edwards.

46. THECLA ISTAPA, nov. sp.

Female. Upper surface brownish, bluish-gray on the hind portion of the secondaries; these are margined by a narrow black terminal line, above which towards the anal angle are four rounded or lunulate black spots, of which the last two are the largest; a slender tail proceeds from the extremity of the first median veinlet.

Under surface pale brownish-gray; an obsolete double row of brownish lunules, separated by whitish crescents along the outer margin of the primaries; within, a curved row of six dark brown spots, edged exteriorly with white.

Secondaries have a brown discal arc, a dark brown spot within, and another above the cell, both ringed with white; beyond the cell a sinuated row of dark brown streaks and dashes, edged posteriorly with white; following these is a series of white sagittate marks, and a marginal row of indistinct brown ocelli, ringed with white. The second from the anal angle is black, covered by a luteous crescent; there is also a small black spot on the anal lobe, similarly surmounted. Expanse ·85 inch.

Body and antennæ as in *Th. yojoa.*

Hab.—"Mexico, near Vera Cruz." Wm. H. Edwards.

Very closely allied to the preceding species, especially upon the upper surface; underneath, however, the differences are considerable.

47. ERYCIDES LILEA, nov. sp.

Upper surface shining blue-black, irrorated with lustrous green particles over the basal area and the body; a large fulvous red costal spot on the primaries, cut by the sub-costal vein; outer margin of both wings, including the anal angle of secondaries, fringed with white hairs, especially long upon the latter.

Underneath as above, but destitute of the green irrorations. Expanse 2·25 inches.

Body blue-black, the palpi, excepting the terminal joint, and a collar, fulvous-red; antennæ black.

Var. a; the abdominal margin is fringed with dark brown hairs, encroaching slightly upon the white anal ciliæ.

Hab.—"Mexico, near Vera Cruz." Wm. H. Edwards.

A local race of the well-known *Erycides palemon.*

48. Goniloba azul, nov. sp.

Upper surface dark brown; basal third of both wings brilliantly glossed with shining blue; on the primaries, a short, translucent-white costal bar, towards the apex cut into five spots by the subcostal veinlets and radials; a broad mesial, transverse, transparent, white band, composed of six spots, extends from the inner third of the costa to near the outer margin, a short distance above the inner angle.

Underneath brown, with a darker median shade on both wings; markings of primaries remain the same; a yellow spot at their base, and beyond, as far as the central transverse band, glossed along and below the costa with shining blue.

Costa of secondaries broadly white at the base, and tapering towards the middle, there terminating; a small brown spot at the shoulder, before which it is faintly yellowish. Expanse 2·5 inches.

Body brown, clothed above on the thorax with shining blue hairs, below with ochreous yellow; abdomen brown, the segments marked with blue hairs above and brown below. Head and collar lustrous green; palpi yellowish-white. Antennæ black.

Hab.—"Mexico, near Vera Cruz." Wm. H. Edwards.

49. Leptalis mita, nov. sp.

Male. Above sulphur-yellow; fore wings with a black outer margin, broadest at the apex, there extending along the costa a little more than quarter its length, and terminating in a rounded knob, resting upon the first median veinlet; the interior outline of this marginal band is sinuated, and shaped much as in the allied species *kollari* and *licinia*, presenting two interior, deeply curved indentations, and a short, nearly straight line on the costa; this border also contains in its upper part an oblique yellow bar, touching the costa, and rounded posteriorly. Basal portion of costa powdered with black atoms; a short oblique black bar runs to the sub-costal vein, at about the middle of the margin.

Secondaries immaculate. Expanse 1·87 inches.

Underneath sulphureous; the outer portion of the black margin disappears, leaving only a transverse apical black belt, extending to neither margin; the black costal bar remains, and there are some continued black atoms in the cell below it.

Secondaries present a transverse blackish ray below the cell, which reaches to neither edge.

Body: thorax above black, covered with yellowish-green hairs, below yellow; abdomen yellowish-white; antennæ black, with white annulations; club purplish-brown.

Hab.—"Mexico, near Vera Cruz." Wm. H. Edwards.

Wings shaped as in *Lept. licinia:* of the described species, it approximates most nearly to the *Lept. isodrita*, Boisd., of Brazil, of which it is probably a northern modification.

50 Achlyodes Hewitsonius, nov. sp.

Upper surface: primaries grayish brown, flecked with spots, and crossed by lines of paler hue; a dark brown terminal line along the outer margin, followed by a right line of pale grayish brown, which runs obliquely inwardly from the apex, becoming lost in the discal shades; then a large apical triangular fulvous-brown patch, with the base placed on the costa, and an oblique band of the same color running from the lower portion or apex of the triangle down to the middle of the inner margin, the veins and veinlets crossing both becoming dark brown during their passage; a large interior trapezoidal patch, darkest at either end, extends from the costa to the lower part of the cell, and a subbasal transverse band stretches from the subcostal to the submedian vein, both fulvous brown.

Secondaries ochraceous, more brownish on the abdominal margin, and

tinged with orange towards the costa; a terminal brown line as on the fore wings; a narrow discal bar, a broad belt across the middle of the cell, connected above with two equally broad spots, both extending to the costal nervure, and commingling below with the dark abdominal shades; an irregular transverse band, twice bent at right angles near its middle, beyond the cell, extending from the first subcostal veinlet to the submedian vein; all dark brown; expanse 2·5 inches.

Underneath the primaries are ochreous, paler towards the outer margin, and with an ashy apical spot; the markings of the upper surface are almost obsolete.

Secondaries dull orange brown; markings as above, but very indistinct; the abdominal and apical areas are strewn with ashy atoms.

Antennæ black, ochraceous beneath.

Hab.—"Mexico, near Vera Cruz." W. H. Edwards.

This, most beautiful as well as one of the largest species of its genus, does not assimilate closely with any of its associates.

I have many other new species of this genus, which I hope to figure at some future time; it is impossible to describe them.

At the time that I wrote the "Notes upon Exotic Lepidoptera," &c., I had had no opportunity of consulting any of Dr. Felder's numerous writings in the "Wiener Entom. Monatschrift." I have now to regret having redescribed several of his species; an error which, however unfortunate, from uselessly multiplying difficulties in the correct determination of species, is scarcely to be avoided when two Entomologists are working upon the same subject at the same time. I append their corrected nomenclature, together with some other synonymical rectifications.

PAP. SEMPERI, Felder.

Pap. semperi, Felder, Wien. Ent. Monatschrift v., p. 297 (1861).
" " " " vi., p. 282 (1862).
" Zool. d. Novara Exp.
Atroph. erythrosoma, Reakirt, Proc. Ent. Soc. Phil., iii., p. 447, n. 2 (1864).

PAP. DÆDALUS, Boisd.

Pap. dædalus Felder, Wien. Ent. Monatschrift, v., p. 298 (1861).
" Zool. d. Novara Exp.
Pap. palinurus, Fab., Reakirt, Proc. Ent. Soc. Phil., iii., p. 463 (1864).

PAP. HYSTASPES, Feld.

Pap. hystaspes, Felder, Wien. Ent. Monatschrift, vi., p. 283 (1862).
" Zool, d. Novara Exp.
Pap. varasi, Reakirt, Proc. Ent. Soc. Phil., iii., p. 465 (1864).

PAP. LEDEBOURIA, Esch.

Pap. Horsfieldii, Reakirt, Proc. Ent. Soc. Phil., iii., p. 476 (1864).

PAP. GORDION, Felder.

Pap. gordion, Feld., Zool. d. Novara Exp.
Pap. eurypylus, L., Reakirt, Proc. Ent. Soc. Phil., iii., p. 481 (1864).

PAP. EUPHRATES, Felder.

Pap. Euphrates, Felder, Wied. Ent. Monatschr., vi., p. 383 (1862).
" Zool. d Novara Exp.
Pap. Moorei, Reakirt, Proc. Ent. Soc. Phil., iii., p. 485 (1864).

LEPTOCIRCUS DECIUS, Felder.

Lept. decius, Felder, Wien. Ent. Monatschr., vi., p. 284 (1862).
" Zool. d. Novara Exp.
Lept. meges, Zink., Reakirt, Proc. Ent. Soc. Phil., iii., p. 494 (1864).

PAPILIO CALELI, Reakirt.

Pap. alcamedes, Felder, Zool. d. Novara Exp., p. 36, n. 26, t. vii., f. c. (1865).

Hab.—Guatemala. (Coll. Tryon Reakirt.)
Mexico. (Coll. Entom. Soc.)
New Granada? (Coll. Felder.)

A species of considerable range, and presenting slight modifications throughout, which, however, are not local or confined to particular sections. These are well expressed by Dr. Felder, l. c., p. 27, and may be briefly stated thus.—In the varying size of the white or yellowish white spot between the two last median veinlets of the fore wings, and also in the width of the subtriangular green band; in the presence of one or two greenish streaks of different lengths within the cell above the white spot, and in the longer or shorter red spots upon the hind wings.

PAPILIO TONILA, Reakirt.

Pap. aristomenes, Felder, Zool. d. Novara Exp., p. 38, n. 27, t. viii., f. a. (1865).

Hab.—Guatemala. (Coll. Tryon Reakirt.)
Mexico. (Coll. Entom. Soc. and Felder.)

The only difference between Dr. Felder's excellent figure, and the specimens in my possession, and the cabinet of the Society is, that his *aristomenes* has a white dash above the subcostal vein of the primaries—absent in all which I have seen. I do not doubt but that they are identical. I do not believe that *tonila* is the ♀ of *caleli*, as indicated by Dr. Felder in his *Species Lepidopterorum*, p. 296, n. 107 (1864); it is more nearly related to the ♀ of *mylotes*, Gray, than *caleli* is to the ♂ of that species.

Pap. caleli and *tonila* belong to a group of nearly allied forms of peculiar facies, all inhabiting the northern parts of South, or the tropical portions of North America; their co-members are *mylotes*, Gray, *timias*, Dbldy., and *eurimedes*, Cram.; the last, possessed of the greatest range, is most probably the parent stock of the other and segregated species.

PAPILIO GUNDLACHIANUS, Felder.

Pap. Gundlach., Feld. Verhl. d. Zool. bot. Gesellsch. in Wien, p. 294, n. 75 (1864).

Pap. Columbus, Gundl. Herr. Sch. Corr. Bl. Zool. Min. Vereins, xvi., p. 141 (1862).

Not *Pap. Columbus*, Hewits. Trans. Ent. Soc. Lond., n. ser., i., p. 98 (1851.)

Pap. Grotei, Blake, Proc. Ent. Soc. Phil., iv., p. 313 (1865.)

Description of the Hot Springs of Soda Creek, their location, number, temperature and altitude, and the Geological features of the surrounding locality; together with the remarkable discovery of a human skeleton and a fossil Pine Tree in the Boulder and Gravel formation of Soda Bar, Oct. 13th, 1860.

BY E. L. BERTHOUD, C. E.

Soda Creek is in Long. 105° 40′. Lat. 39° 35′. Approx. altitude above the sea 6570 feet.

Time of observation 10 A. M., Oct. 13th, 1860. Wind W. S. W. Sky cloudless. Therm. in air 57° F. Temperature of Soda Creek 45° F.

1st.	Spring	temperature	of water	98° F.
2d.	"	"	"	99° "
3d.	"	"	"	55° "
4th.	"	"	"	54° "
5th.	"	"	"	55° "
6th.	"	"	"	91° "
7th.	"	"	"	90° "

There are numerous other cold and warm springs that issue from the surface in every direction, but not deep or large enough to give a fair average temperature. The water of these springs deposits on the surrounding ground and stones a saline efflorescence of a pure white, and with a soda or saline taste. Several of the hot springs are continually depositing a tufa, which has formed around them all dome-shaped hillocks, with basin-like cavities in the centre, from which the water, mingled with a constant rush of bubbles of gas, boils up like a seething caldron. The waters have an acid taste not unpleasant, with decidedly chalybeate qualities, which approximate it very much to the famed Congress Springs of Saratoga, N. Y. Iron is deposited by several of the springs, giving a reddish tinge to the tufa. The springs are situated from three to thirty feet above the level of Soda Creek, a clear cold mountain stream, with gravelly bed; for a long distance below the springs, the gravel in the bar and bed of Soda Creek are cemented by the tufa deposited by the hot springs. It has evidently been always a place of resort for the mountain sheep (Ovis montana,) mountain goat (Capra Amer.) and buffalo (Bison Amer.) who delight to lick the incrustations and drink the waters of these springs. This is shown by their numerous bones found above and under ground near the springs. Indeed, as late as July 3d, 1860, three mountain sheep were killed near these springs. In the springs, both hot and cold, confervæ and a few grasses grow; no fish, however, are found in them; no crustacea except perhaps one about 1¼ inches long, which is found in the hot springs, and which has a hard covering and rudimentary legs. This insect, crustacean, or whatever it may be, is very much of the color, size and shape of the kind found in Great Salt Lake, by Captain Fremont, in 1843—44.

The flora of the neighboring region to these springs is rather scanty, and comprises the following more common species:

Juniperus communis.	Sesleria dactyloides.
Juniperus virginianus.	Bromus, sp. undet.
Pinus variabilis.	Poa, " "
Pinus fraseri.	Elymus hystrix.
Salix tristis.	Helianthus, sp. undet.
Populus angulata.	Aster, 2 sp. undet.
Populus tremuloides.	Cynoglossum, sp. undet.
Alnus incana.	Euchroma coccinea.
Cornus sericea.	Cactus opuntia.
Solidago secunda?	Astragalus, 3 sp.
Stanleyi integrifolia.	Baptisia, 1 sp. undet.
Camelina, 1 sp.	Sisymbrium, 1 sp.
Draba, 2 sp.	Barbarea, 1 sp.
Calochortus luteus.	Fragaria virginiana.
Sorbus, sp. undet.	Rubus spectabilis.
Spiraea, " "	" idaeus.
Rosa, " "	Ribes floridum.
Vaccinium, sp. undet.	Ribes, 2 sp. undet.

What, however, renders the locality of the Hot Soda Springs still more remarkable, aside from their singular character, and the picturesque scenery of their surrounding location, is the following fact recently developed:

About the last days of September, 1860, two miners, who had been for two months and a half opening a mining claim about 200 yards S. W. of the springs and at the foot of the hill marked on the map Soda Hill, reached at last in the gravel, boulders and rocky deposits of Soda Bar, a depth of 22 feet; here at this depth and about 3 yards from the foot of the hill slope, they found a human skeleton, lying on its face and imbedded in a deposit of gravel, sand, small boulders, and fragments of the adjacent rock *in situ*, which from 2 feet below the surface in this locality yields a very fine rich quality of coarse gold. The skeleton, all whose larger bones, though very light and porous, were yet intact, and whose skull was also entire, was in a very tolerable state of preservation;

under the skeleton and about 2 feet lower down, they found upon the surface of what the miners call "red rock," the trunk, limbs and roots of a small pine tree, identical in all respects with the red pine (P. variabilis) of the adjacent slopes: the bark appeared charred and blackened, the wood was light, yellow and apparently sound, showing the fibrous woody structure, the knots, the annual rings of growth, identical with *variabalis*: on exposure to air, however, it soon became soft and crumbled, more like rotten, or water soaked wood. The roots and limbs appeared as if violently compressed or forced in the seams of the underlying rock. There, then, was a point conclusively shown, namely, that prior to the cause which covered Soda Hill, Soda Bar and Dry Diggings Hill with its enormous beds of gravel, sand and boulders, and its native gold, (which is everywhere sought for in this locality, from the lowest points of Payne's and Illinois Bars, 2½ feet above Clear Creek up to the highest points where it can availably be mined and hauled to water) man roved and dwelt in this region, timber grew, and everything requisite to furnish food to mankind and the brute creation must have flourished in proximity. Here then we have, within the period of man, evidence that either the convulsions which caused the emergence of the Rocky Mountain range in Western Kansas is a very late geological phenomenon, or that some sudden cause, the upheaval perhaps of the higher Central range, through the metamorphic granite, the talc and mica slates of the lower Eastern ranges of the Rocky Mountains, scooped out the low interior mountain basin in which the Gregory, Russell, Nevada, Lake and other gulches now mined and populated are located; and that then, as the floods, be they of mud, water, or snow and ice, caused by the disturbed equilibrium of the older chain of mountains, by the sudden emptying of Mountain Lakes perhaps, or by the sudden melting of snows and deluges of rain, then subsided, and the vast fissures through which Clear Creek now finds its way into the Platte gave way to the pent up waters; then perhaps the receding waters, still carrying a vast amount of detritus as the waters subsided, left them in their present location. Indeed, one is at once surprised at the location of the so-called Pike's Peak Gold Mines of Gregory and Clear Creek.

After looking over a lofty mountain road for 16 miles, we descend from 1000 to 2000 feet into an interior mountain basin, surrounded on all sides by mountain ranges of much greater altitude, and through which but one avenue has been opened, where Clear Creek or Vasquez Fork of Platte river finds its way into the vast prairies extending from the foot of the mountains to the Missouri river. Perhaps it may be urged that glacial phenomena may account for this anomalous fact. In answer we can say that, from the evidence before us, the climactic condition of the present time, carried out by the identity of the long buried flora of the period when this convulsion took place with the one now in existence, forbid us from supposing that the Central range (or Snowy range, more commonly so-called,) was ever the seat of Glaciers large or extensive enough to cause phenomena at all adequate to explain the changes and erosions now so plainly seen in the valley of Vasquez Fork, or in the upper mining region. The lofty summits of Long's and Pike's Peaks, the intermediate lofty chain, the high mountains between Clear Creek and Bear Creek, although they retain in places deposits of snow and small beds of ice, yet nothing is ever found upon them answering the appearance of constant glaciers, whose accretion in cold summers and diminution in warm summers write upon the bare mountain peaks a history of their force and continued action. As a proof of the recent date of the convulsions that have in ages past furrowed and torn up the Plutonic rocks of the east side of the range, that have upreared the tertiary strata at the foot of the mountains, until their almost perpendicular strata form a secondary valley parallel with the valley of the South Platte and has spread over the vast plains of the Platte and Kansas Rivers, the boulders, gravel and sand formed of Feldspathic granite, it is interesting and valuable, and may be a guide, a clew to the solution of the question by which the valley of the Platte, the interior prairie of South Park, the complete want, over a vast ex-

tent of country, of timber and vegetable soil may be accounted for, by the draining and disappearance of vast bodies of fresh water; whatever cataclysm buried this member of the human family, be he Aztec, Indian, Esquimaux or Mound builder, he is for the region above mentioned, "homo diluvii testis." We confess that our preconceived notions of the antiquity of this globe have received a severe shock by this discovery, and have modified our views of the relative antiquity of the strata of this globe and the age of this part of the continent; with a wish that some more able pen will help to elucidate this strange point, we present these few facts.

A list of minerals found in the Rocky Mountain Mining Region, between Long. 105° *and* 106°. *Lat.* 40° *and* 39° *N.*

Native iron.	Magnetic iron ore.	Quartz crystals.
" copper.	Bog " ore.	Milky quartz.
" gold.	Specular " ore.	Vitreous quartz.
" silver.	Tourmaline.	Smoky quartz.
" alum.	Garnet.	Argentiferous galena.
Sulphuret of iron.	Wavellite.	Kaolin.
" lead.	Stilbite.	Laumonite?
" copper	Arragonite.	Brown coal.
" zinc.	Carb. of lime.	Graphite.
Auriferous pyrites.	Mica.	Manganese.
Arsenical pyrites.	Talc.	Selenite.
Blue copper ore.	Feldspar.	Gypsum.
Green copper ore.	Albite.	Alabaster.

December 4th.

The President, DR. HAYS, in the Chair.

Thirty-seven members present.

Dr. Leidy made some remarks upon a collection of fossil bones, recently brought from the Mauvaises Terres of White River, Nebraska, by Prof. Hayden. Among the fossils he exhibited the fragments of a jaw, upon which he characterized a new sabre-toothed tiger, under the name of Drepanodon or Machairodus occidentalis, a species larger than its cotemporary the D. primævus.

December 11th.

The President, DR. HAYS, in the Chair.

Fifty three members present.

The following were presented for publication: "List of Coleoptera collected in Lycoming Co." "List of Coleoptera collected near Fort Whipple." "Revision of the Dasytini," and "Additions to the Coleopterous Fauna of the United States, No. 1." By John L. LeConte, M. D.

"Descriptions of some new Cicindelidæ from the Pacific Coast," and "Descriptions of new Coleoptera of Central America." By Geo. H. Horn, M. D.

"On a new genus of Homoptera." By Henry Shiner.

The elections postponed from the last meeting for business were held with the following result:

Albert R. Leeds, A R. Calhoun, Joseph C. Turnpenny, John Ford, Edwin J. Houston and W. S. Grant, were elected members.

December 18th.

MR. VAUX, Vice-President, in the Chair.

Fifty members present.

The following were presented for publication: "On the consumption of force by plants." By Thomas Meehan.

"A second study of the Icteridæ." By John Cassin.

December 25th.

MR. VAUX, Vice-President, in the Chair.

Twenty members present.

The meeting adjourned until the following evening, Wednesday, Dec. 26th.

December 26th.

MR. VAUX, Vice-President, in the Chair.

Forty-two members present.

On favorable report of the respective committees, the following were ordered to be published:

List of COLEOPTERA collected in the Mountains of Lycoming County, Pa.

BY JOHN L. LECONTE, M. D.

During the first week of June, 1866, I had the good fortune to make one of a party who visited Lycoming County, to indulge in the pleasure of trout-fishing. Our station was on the Loyalsoc Creek, about thirty miles from Williamsport.

The collection contained so many species not previously known in Pennsylvania, that it has seemed to me, though small in extent, to merit particular consideration; the more so, because it indicates the necessity of greatly-increased collections in the mountain regions, before we can begin to map out accurately the distribution of our species. The names correspond with those in my list of North American Coleoptera.

Some of the more interesting new species, belonging to groups which I have already investigated, I have named. The descriptions will be found in the following pages of this volume. Two of them I have dedicated to members of the party, who, although unknown to the literature of science, appreciate enthusiastically the beauties of nature; and manifested, by their ardent pursuit of the finny game, and their accurate knowledge of his habits, such natural taste for scientific employments, as would, doubtless, had earlier opportunity favored, have much diminished the labor yet to be performed by students of Zoology in this country.

Nebria pallipes.
Cychrus (Sphærod.) canadensis.
Lecontei.
Schizogenius amphibius.
Calathus (Pristodactyla) impunctata.
Platynus angustatus.
marginatus.
extensicollis.
molestus.
lævis || *Lec.*
Olisthopus parmatus.
Pterostichus sustentus.
rostratus.
honestus.
mancus?
caudicalis.
mutus.
Luczotii.
coracinus.
stygicus.

[Dec.

Pterostichus lachrymosus.
Myas foveatus.
Amara? n. sp.
Dicælus politus.
Anomoglossus emarginatus.
Chlænius sericeus.
cordicollis.*
pensylvanicus.
Atranus pubescens.
Anisodactylus Harrisii.
nigerrimus.
Eurytrichus nitidipennis.
Bradycellus vulpeculus.
rupestris.
Harpalus longicollis.
spadiceus.
Stenolophus ochropezus.
Patrobus angicollis.
Bembidium nigrum.
n. sp.
simplex.
planum.
semistriatum.
Tachys tripunctatus.
nanus (*ornat.* Say).
flavicauda.
Necrophorus pygmæus.
Catops Spencianus.
terminans.
Scydmænus bicolor.
Batrisus globosus.
two other species.
Falagria cingulata n. sp.
Myllæna sp.
Aleocharini, 6 sp. not determined.
Coproporus ventriculus.
Conosoma crassum.
Knoxii n. sp.
opicum.
Bryoporus testaceus.
Philonthus lomatus.
one other sp.
Xantholinus cephalus.
Baptolinus macrocephalus, var?
Lathrobium punctulatum.
collare.
spec. not described.
Cryptobium badium.
bicolor.
Sunius longiusculus.
Stenus egenus.
Oxytelus sculptus.
Trogophlœus not described.
Anthophagus cæsus.
near verticalis.
Amphithroum lævicolle n. sp.
Anthobium sp.
Hister americanus.
Olibrus nitidus.
Carpophilus brachypterus.
Epuræa not described.
Endectus hæmatodes.
Philothermus glabriculus.
Clinidium conjungens.
Lathridius liratus.
Corticaria pumila.
americana.
Litargus 4-spilotus.
Cytilus varius.
Platycerus quercus.
Onthophagus Hecate.
Aphodius n. sp.
Hoplia trifasciata.
Cremastochilus canaliculatus.
Throscus Chevrolatii.
Cryptohypnus planatus.
pulchellus.
Elater nigricollis.
luctuosus.
fuscatus.
rubricus.
Melanotus inæqualis.
Limonius aurifer.
ectypus.
Sericosomus silaceus.
Prionocyphon discoideus.
Cyphon ruficollis and var.
pallipes.
modesta.
Photinus corruscus.
Podabrus punctatus.
Pattoni n. sp.
Telephorus carolina.
rectus.
tuberculatus.
Attalus flavilabris.
Clerus thoracicus.
Cis, sp. not determined.
Phellopsis obcordata.
Boletophagus depressus.
Paratenetus punctatus.
Corphyra terminalis.
Canifa pusilla.
Penthe obliquata.
Melandrya striata.
Anaspis flavipennis.
rufa.
Mordella scapularis.
Asclera ruficollis.
Curculionidæ not determined.

* This is the species which I have regarded as C. chlorophanus *Dej.* I am informed by my friend, Mr. Sallé, that the types of the latter belong to the western species known as C. solitarius *Say.*

Tomicus pyri.
Molorchus bimaculatus.
Leptura ruficollis.
sphæricollis.
Orsodacna Childreni.
Chrysomela vulgatissima.
(blue var.)
Haltica violacea *Mels.*
Diabrotica vittata.
Galleruca decora.
Engis 4-maculata.
Dacne heros.
Triplax sanguinipennis.
Mycetina perpulchra.
Psyllobora 20-maculata.
Hyperaspis elegans.
Scymnus lacustris.

List of COLEOPTERA collected near Fort Whipple, Arizona, by Dr. Elliott Coues, U. S. A., in 1864—65.

BY JOHN L LECONTE, M. D.

At the request of Dr. Coues, it was my intention to prepare a catalogue of the Coleoptera, thus far known from Arizona. On reflection, it seems to me that such a list would be at present of but little value to entomologists; partly because all the species previously examined by me are mentioned in my memoir on the Coleoptera of the U. S. and Mexican Boundary,* but still more, because Dr. G. H. Horn, recently Surgeon of California Volunteers, having spent four years in collecting through California and Arizona, has returned with much new material. Any list of species now made would, therefore, soon be rendered useless by the investigation of his collections. For these reasons I have confined myself to a list of the species submitted to Mr. Ulke and myself by Dr. Coues. The new species are described with others in the present number of the Proceedings.

Amblychila cylindriformis.
Cicindela obsoleta (race β).
nigrocœrulea.
guttifera.
punctulata var.
Calosoma carbonatum.
Lachnophorus elegantulus.
Discoderus impotens.
Tachys audax.
Acilius flavomaculatus.
Laccophilus truncatus.
Hydroporus striatellus.
Berosus punctatissimus.
subsignatus.
Hydrocharis glaucus.
Silpha truncata.
Creophilus villosus.
Belonuchus formosus.
Philonthus flavolimbatus.
inquietus.
Saprinus pratensis.
Tribrachys caudalis.
Trogosita n. sp?
Lasconotus laqueatus n. sp.
Aulonium longum n. sp.
Dorcus? mazama.
Canthon indigaceus n. sp.
Ochodæus simplex.
Trox punctatus.
Macrodactylus angustatus.
Plusiotis gloriosa.
Cyclocephala manca n. sp.
Xyloryctes Satyrus.
Dynastes Tityus.
Strategus cessus n. sp.
Gyascutus sphenicus
Ancylochira alternans.
Melanophila atropurpurea.
Acmæodera amplicollis n. sp.
decipiens n. sp.
Agrilus Couesii n. sp.
Chalcoblepidius Webbii.
Cryptohypnus inops.
Horistonotus simplex.
Photinus nigricans.
Chauliognathus scutellaris.
Pristoscelis convergens n. sp.
atricornis n. sp.
Amphicerus punctipennis.
Eurymetopon abnorme.
Epitragus n. sp.
Zopherus n. sp.
Eleodes obscura.
sulcata.
obsoleta.
extricata.
Embaphion contusum.
Blapstinus pubescens.

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*Journ. Acad. Nat. Sci., Phila., 2d ser., iv. 9, (1858).

Cerenopus sulcipennis.
Hypophlœus parallelus.
Sitophagus planus.
Notoxus, two species.
Pentaria trifasciata.
Meloe sublævis.
Megetra cancellata.
Epicauta maculata
sericans.
ferruginea.
Lytta biguttata.
puberula.
Tetraonyx fulva.
Nemognatha immaculata.
Tanymecus lautus.
Prionus californicus.
Criocephalus sp.
Sphenotheca suturalis.
Tylosis sellatus.
Elaphidion procerum.
tenue.
Clytus sagittatus.
Æthecerus Wilsoni Chevr.
Arhopalus Wils. Horn.
Clytus cinctus Chevr.
Œdilis spectabilis.
Tetraopes basalis.
Oncideres sp.
Chrysomela dislocata.
Chrysomelide not determined.
Hippodamia convergens.

Revision of the DASYTINI of the United States.

BY JOHN L. LECONTE, M. D.

Having recently had occasion to examine all the species of Dasytini in my collection, I have detected among specimens received since the publication of my previous memoir, in 1852, several undescribed species. In order to fix more definitely the characters, not only of the new species, but of those previously described, I have prepared a sketch of the genera and analytical tables of the species before me.

Much of the Pacific district yet remains unvisited by collectors, and a large increase in the number of representatives of this tribe may be expected from future explorations.

In all the genera found in our territory, as far as known to me, the terminal spurs of the anterior tibiæ are very small. They may be tabulated as follows:

A. First joint of tarsi not shorter than the second; (claws of tarsi equal in length, second and third joints of tarsi not dilated, and last joint of palpi not securiform in any of our genera):	
Anterior tibiæ with an external row of spines.....	Pristoscelis.
Anterior tibiæ without spines:	
Membranous appendages equal, nearly as long as the claws; in great part connate.....	Listrus.
Appendages connate; one long, the other shorter	Dolichosoma.
One appendage long, connate, the other dentiform.....	Allonyx.
Both appendages short, connate, usually dentiform.....	Dasytes.
Membranous appendages long, equal, free to the base.....	Eschatocrepis.
B. First joint of tarsi shorter than the second.....	Melyris.

On comparing this table with those of European genera, as given by DuVal* and Kiesenwetter,† it will be seen that the characters here ascribed to Listrus correspond with those of Lobonyx, and those of Eschatocrepis with those of Haplocnemis. The differences will be mentioned under the respective genera.

* Genera des Coleopt. d'Europe. iii., 190.
† Insecten Deutschlands, iv., 624.

PRISTOSCELIS Lec.

Under this name I have grouped the species of North America, in which the anterior tibiæ are furnished with a distinct series of spines on the outer margin. Important differences in pubescence and form exist among the species, which have, so far as they were known to him, been distributed by Motschulsky into genera, which he has named *Byturosomus* (Group I.), *Trichochrous* (Group II.), and *Emmenotarsus* (Group III.) In order to avoid a change of gender in the specific names of the species thus far described, I have arbitrarily made the generic name masculine, instead of feminine, as required by a strict adherence to classical construction.

The following table expresses the relations between the species before me:

I. Prothorax twice as wide as the head, pubescence prostrate, with a few intermixed longer erect hairs ..... 1. fuscus.

Prothorax scarcely one-half wider than the head:

II. Pubescence prostrate without intermixed erect hairs:

Legs entirely black:

Sides of thorax broadly rounded:

Pubescence fine ..... 2. ater.

Pubescence dense ..... 3. oregonensis.

Sides of thorax strongly rounded ..... 4. laticollis.

Legs brown or testaceous:

Thorax quadrate, sides feebly rounded: antennæ black;

Pubescence fine, femora darker ..... 5. fulvitarsis.

Pubescence coarse, femora and tibiæ uniform in color ..... 6. atricornis.

Thorax narrowed in front, not transverse; legs rufous:

Elytra nearly uniform in color ..... 7. convergens.

Elytra broadly margined with rufous ..... 8. umbratus.

Thorax transverse, narrowed in front ..... 9. antennatus.

Thorax transverse, sides strongly rounded;

Elytra coarsely punctured ..... 10. brevicornis.

Elytra finely punctured ..... 11. erythropus.

III. Pubescence intermixed with erect hairs:

a. Sides of thorax not distinctly serrate:

Body above densely clothed with coarse brown hair:

Pubescence short, antennæ and feet black ..... 12. brevipilosus.

Pubescence long, antennæ and feet rufous ..... 13. hirtellus.

Pubescence long, antennæ and feet black ..... 14. sordidus.

Body above with fine gray pubescence:

Antennæ and legs black, body black:

Thorax narrowed in front, sides feebly rounded ... 15. suturalis.

Thorax not narrowed in front:

Sides feebly rounded, and

distinctly sinuate behind ..... 16. quadricollis.

not sinuate behind, hind angles distinct ... 17. Tejonicus.

Sides moderately rounded, hind angles indistinct:

Head moderate:

Elytra moderately punctured.

Legs black ..... { 18. conformis. / 19. squalidus.

Tibiæ and tarsi pale ..... 20. cruralis.

Elytra very coarsely punctured:

Thorax transverse ..... 21. æneseens.

Thorax not wider than long ..... 22. punctipennis.

Head very large, not narrower than the thorax ..... 23. grandiceps.

Legs rufous or testaceous, body black:
Thorax finely sparsely punctured.. ..... 24. pedalis.
Thorax coarsely sparsely punctured..... 25. texanus.
Black, elytra and legs rufous..... ..... 26. rufipennis.
b. Sides of thorax distinctly serrate:
Entirely black, elytra densely punctured..... 27. serrulatus.
Black, elytra and legs rufous..... ..... 28. serricollis.

Group I. BYTUROSOMUS Motsch.

But one species of this group is known to me. It is of oblong oval form, rather more robust than the other species; the prothorax is twice as wide as the head, and in the male is wider than the elytra; it is wider than long, broadly rounded on the sides, and obliquely subsinuate each side at the base; the angles are all rounded. The pubescence of the thorax is less dense than that of the elytra; a few longer suberect hairs are intermixed with the prostrate ones. The front tibiæ are longer than usual, slender and slightly curved in the male, and the row of small spines on the outer side is very distinct. The appendages of the claws are broad, and connate with the claw; the outer one is free for a very short distance.

1. P. fuscus. *Dasytes fuscus* Lec. Pr. Ac. N. Sc., vi., 169. *Byturosomus griseus* Motsch. Bull. Mosc. 1859, ii., 395. *B. rufipes* Motsch. ibid.

Vallecitas, San Diego County, California; May. The differences between the sexes are so great that unless found together they might be readily considered distinct species; in the male the thorax is wider than the elytra, and much less densely pubescent; the elytra are gradually narrowed from the base; the abdomen is composed of six ventral segments, and the front tibiæ are elongated, and curved inwards: in the female the body is not attenuated behind, the thorax is as wide as the elytra, gradually narrowed in front, and densely pubescent; the abdomen has but five ventral segments, and the anterior tibiæ are not curved. In both sexes the fourth joint of the antennæ is narrower than the fifth, though somewhat triangular.

Col. Motschulsky has by some accident interchanged the names of D. fuscus and D. griseus Lec. Of the latter I had but a single specimen, and was therefore unable to furnish him with a type; D. fuscus, on the contrary, was collected by me in large numbers, and has been freely distributed.

Group II. TRICHOCHROUS Motsch.

In this group the body is elongate, or elongate oval, the thorax not more than one-half wider than the head; the pubescence is prostrate without any intermixed hairs, though in some species (antennatus, brevicornis, &c.) clothed with long and coarse pubescence, the hairs lie less closely on the surface than in the others. The characters given in the synoptic table will enable the species to be recognized without difficulty.

2. P. ater. *Pristoscelis atrus* Bland. Proc. Ent. Soc. Phila., iii., 253.

Abundant near San Francisco. This species differs from P. laticollis by the larger size, by the thorax being more distinctly transverse, with the sides less rounded, and the posterior angles more distinct, although obtuse; the sides of the thorax, as in the next two, are fringed.

3. P. oregonensis, elongatus, piceo-æneus, dense cinereo-pubescens, thorace longitudine sesqui latiore, lateribus fimbriatis late rotundatis, apice late emarginata, basi late rotundata, angulis anticis subacutis, posticis obtusis haud rotundatis, disco subtiliter sat dense punctato; elytris modice convexis, confertim subtiliter punctatis; subtus nigricans, antennis palpisque nigris, tibiis tarsisque picescentibus. Long. 3·5—4 mm.

Oregon, and at Fort Crook, California, Dr. G. H. Horn. This species is

related to P. ater, but differs by the form of the thorax, and by the pubescence being more dense, and less fine; from P. laticollis it differs by the thorax being much less rounded on the sides, more emarginate at the apex, causing the anterior angles to be quite distinct, and the hind ones less obtuse.

4. P. laticollis. *Dasytes laticollis* Mann. Bull. Mosc., 1843, 247.

California, near San Francisco. I am indebted to Col. Motschulsky for a type of this species; other specimens were found by Mr. G. Davidson at Cape Keyes. The thorax is wider than long, much rounded on the sides, equally narrowed at base and apex, with the hind angles indistinct.

5. P. fulvitarsis *Bland*, Proc. Ent. Soc. Phila., iii., 254.

Middle California, Mr. Ulke. A slender species, still smaller than the preceding, with the thorax scarcely wider than long, fringed with long hairs on the sides, which are broadly rounded, and with the hind angles distinct, obtuse. The antennæ are black, and the legs testaceous, with the thighs somewhat darker. In the male the sixth ventral segment is visible; the fifth joint of the antennæ in both sexes is wider than the sixth, and the fourth joint is triangular, rather broader than long.

6. P. atricornis, elongatus, nigro-æneus, pube cinerea minus subtili dense vestitus, capite subtiliter haud dense punctato; thorace capite paulo latiore, convexo modice punctato, latitudine longiore, antrorsum subangustato, lateribus paulo rotundatis pilis longioribus fimbriatis, basi rotundata, angulis posticis rotundatis; elytris thorace vix latioribus, convexis, sat dense punctatis, transversim subrugosis, margine laterali pilis longioribus fimbriato; antennis nigris, pedibus rufo-testaceis. Long. 4 mm.

Fort Whipple, Arizona, Dr. E. Coues, U. S. A. The antennæ are as long as the head and thorax; the third joint is slender, and longer than the fourth, which is somewhat triangular; the fifth is not wider than the sixth; the eleventh is one-half longer than the tenth, oval and subacute at tip. This species in color resembles P. fulvitarsis, but is much larger, with the thorax slightly narrowed in front, and the legs of a uniform bright reddish-yellow. The anterior tibiæ on the outer margin are armed with 5–7 small spines.

7. P. convergens, elongatus æneo-fuscus, nigricans, pube subhelva minus subtili dense vestita, capite parce punctulato; thorace capite paulo latiore, convexo modice punctato, latitudine longiore, antrorsum sensim angustato, lateribus paulo rotundatis, basi cum angulis posticis rotundata; elytris thorace vix latioribus, convexis sat dense punctatis et transversim rugosis, humeris, indeterminate rufescentibus; ore, antennis pedibusque rufo-testaceis. Long. 4 mm.

One specimen from Fort Whipple, Arizona, Dr. Coues. This species closely resembles the preceding in size, form and sculpture, but the pubescence is yellowish, and the antennæ and oral organs are not black but reddish-yellow. The color is brownish-black, with a faint metallic tinge, and the humeri are distinctly reddish-brown. The antennæ are but little longer than the head, the third joint is slender, not longer than the fourth, which is triangular and nearly equal to the fifth, which is not wider than the sixth; the tenth, as usual, is oval, acute, and longer than the preceding.

8. P. umbratus, elongatus, fusco-æneus, sat dense minus subtiliter cinereo-pubescens, pilis vix longioribus concoloribus intermixtis, thorace latitudine paulo breviore, antrorsum sensim angustato, lateribus parum, basi magis rotundatis, apice haud emarginata, angulis obtusis, parce subtiliter punctato; elytris ferrugineis sutura late infuscata, sat dense punctatis; abdominis apice pedibusque læte ferrugineis, antennis palpisque piceis, vel nigris. Long. 2 5 mm.

Mas segmento ventrali sexto prominulo, profunde foveato.

Two males, Fort Crook, California, Dr. G. H. Horn. It resembles in form P. convergens, but that species is much larger and uniformly pubescent, whereas in the present species the coarse pubescence on the elytra is intermixed with somewhat longer suberect hairs of the same color; the long erect hairs observed on the head and thorax of the species of the next division are wanting, and I have therefore regarded it as properly placed next to P. convergens.

9. P. antennatus. *Trichochrous ant.* Motsch. Bull. Mosc. 1859, ii. 394. *Dasytes griseus* Lec., Proc. Ac. Nat. Sc. Phil., vi. 169.

One specimen found by me at San Diego, Cal.; others from the plains near the Rocky Mountains were given me by Mr. Ulke. This species is easily recognized by the thorax being broader than long, gradually but strongly narrowed in front, with the sides feebly rounded, and the hind angles obtusely rounded; the elytra are coarsely punctured. and clothed with long brownish pubescence; the antennæ are piceous, somewhat paler at base; the fifth joint is obviously wider than the sixth in the female, and the feet are ferruginous; The last ventral segment of the male is longitudinally broadly impressed, a character I have not observed in any other species of the present group.

10. P. brevicornis. *Dasytes br.* Lec., Proc. Acad. Nat. Sc. Phil., vi. 169.

San Diego and Middle California. The pubescence is coarse, and the sides fringed with very long hairs; the thorax is broader than long, equally narrowed at base and apex, with the sides much rounded; the elytra are coarsely and more densely punctured than in the preceding; the antennæ are piceous, sometimes nearly testaceous at base; the third joint is scarcely narrower than the fourth.

11. P. erythropus. *Dasytes erythropus* Lec., Pr. Acad. Nat. Sc., vi. 170.

Texas. The pubescence is coarse and dense, and the sides of the thorax somewhat serrate; the spines of the anterior tibiæ are small, and not very distinct, so that this species might readily be referred to Listrus. Its natural affinity seems to be, however, with the preceding, from which it differs by the narrower form, by the thorax being more strongly rounded on the sides, with the base not at all wider than the apex, and by the much less coarse punctuation of the elytra.

Group III. Emmenotarsus Motsch.

The species of this group resemble in form those of the preceding, but differ in having long, erect, black hairs intermingled with the finer prostrate pubescence; in brevipilosus, however, the erect hairs are gray, and but little longer than the pubescence, so that without careful examination they might be overlooked. The row of spines on the outer margin of the anterior tibiæ is more conspicuous than in most of the species of the preceding group. The sixth ventral segment of the males is visible and concave beneath.

12. P. brevipilosus, elongatus convexus, fusco-niger, æneseens, pube sordida breviuscula dense vestitus, capite thoraceque parce punctulatis pilis longis erectis intermixtis, hoc latitudine breviore antrorsum haud angustato base valde, lateribus late rotundatis, angulis posticis obtusis parum distinctis; elytris thorace haud latioribus sat dense punctatis, pilis erectis brevibus intermixtis vix conspicuis, margine laterali pilis longioribus fimbriato. Long. 4 mm.

Middle California. A species of more cylindrical form than usual, and easily known by the intermixed hairs of the elytra being of the same color as the pubescence, and scarcely longer than it.

13. P. hirtellus, modice elongatus, fusco-æneus, pube sordida longa densissime vestitus. pilisque elongatis erectis intermixtis. Capite thoraceque punctulatis, hoc latitudine breviore, antrorsum sensim angustato, basi valde,

lateribus late rotundatis, angulis posticis rotundatis haud distinctis; elytris thorace paulo latioribus, sat dense punctatis; antennis palpis pedibusque ferrugineis. Long. 4 mm.

Cape San Lucas, Lower California, collected by Mr. Xàntus. In the male the head is but little narrower than the thorax, the antennæ are longer than the head and thorax, strongly serrate, with the third joint triangular, not narrower than the fourth or fifth; in the female the thorax is about one-half wider than the head, the antennæ are shorter than the head and thorax, moderately serrate, with the third joint narrow, and the fourth triangular, but not as wide as the fifth. The intermixed erect hairs are of the same color as the pubescence, but much longer.

14. P. sordidus. *Dasytes sordidus* Lec., Proc. Acad. Nat. Sc. Phila., vi. 169.

San Diego, California. The pubescence is as coarse as in the preceding, and the intermixed hairs as long, but the thorax is considerably rounded on the sides, and not narrowed anteriorly; and the antennæ palpi and legs are black.

15. P. suturalis. *Dasytes sut.* Lec., Proc. Acad. Nat. Sc. Phila., vi. 169.

San Diego, California. The pubescence is cinereous, and fine, more dense at the suture, sides and tip of the elytra, which are more finely and densely punctulated than in the allied species; the thorax is narrowed from the base to the tip, the sides very feebly rounded and slightly serrate, the base broadly rounded, and the hind angles well marked, and somewhat obtuse. The elytra in the male are not wider than the thorax at base, and gradually narrowed behind. The third joint of the antennæ is scarcely triangular, the fourth is slightly dilated, but not so wide as the fifth. The female only differs from the male by the elytra not being narrowed from the base, and by the antennæ being a little shorter.

16. P. quadricollis. *Dasytes quadr.* Lec., Proc. Acad. Nat. Sc. Phila., 1859, 75.

Fort Tejon, Cal., Mr. Xàntus. Easily recognized by the thorax being quadrate, with the sides scarcely rounded, subsinuate behind, with the posterior angles rectangular, not rounded; the base is broadly rounded, as in the preceding species.

17. P. tejonicus, elongatus, niger, æneseens, pube longiuscula minus subtili sat dense vestitus, pilis longis nigris erectis intermixtis, capite thoraceque parce punctulato, hoc latitudine breviore, subquadrato antrorsum haud angustato, lateribus late rotundatis, basi rotundata, angulis posticis obtusis haud rotundatis; elytris thorace latioribus, sat dense punctatis, pedibus sæpe nigro-piceis. Long. 2·5—4 mm.

Fort Tejon, California, Mr. Xàntus. The pubescence is coarser than in the neighboring species, but less so than in P. sordidus. It differs from P. quadricollis by the sides of the thorax not being sinuate behind, and from P. conformis, &c., by the more distinct hind angles and less rounded sides. The feet in several of the specimens before me are dark brownish.

18. P. conformis. *Dasytes conf.* Lec., Proc. Acad. Nat. Sc., vi. 169.

San Diego. The pubescence is gray, and not very fine, and in some specimens is denser at the suture and sides of the elytra, as in P. suturalis. The sides of the thorax are strongly rounded, and the hind angles indistinct; the elytra are not wider than the thorax and the punctures are finer than in P. aenescens, and about as in quadricollis and Tejonicus.

19. P. squalidus. *Dasytes sq.* Lec., Proc. Acad. Nat. Sc. Phila., vi. 169.

Differs from the types of P. conformis only by the gray pubescence being more dense, and the sides of the thorax a little less rounded, and by the smaller size.

[Dec.

20. P. cruralis, elongatus fusco-æneus, pube minus subtili cinerea vestitus, pilis brevibus concoloribus intermixtis, capite thoraceque sat dense subtilius punctatis, hoc latitudine sesqui breviore lateribus et angulis fortiter rotundatis, basi late rotundata; elytris subtilius punctatis; antennis palpis femoribusque nigris, tibiis tarsisque flavo-testaceis. Long. 2·5 mm.

Two specimens, Oregon, Dr. G. H. Horn; the sixth ventral segment is visible in each, and is not impressed. This species is very similar to P. squalidus, but the erect hairs are much shorter, and of the same color as the pubescence, and the tibiæ and tarsi are pale.

21. P. aenescens. *Dasytes æn.* Lec., Proc. Acad. Nat. Sc., vi. 170.

San Diego and the Islands off Santa Barbara. The pubescence is very fine, and the intermixed black hairs numerous; the thorax is a little wider than long, more rounded on the sides than in the preceding, but with the hind angles somewhat distinct; the elytra are a little wider than the thorax, and much more coarsely punctured than in the allied species.

22. P. punctipennis, elongatus, niger nitidus subæneseens, pube cinerea subtili vestitus, (pilis nigris erectis intermixtis?) capite thoraceque parce punctulatis, hoc latitudine vix breviore, lateribus rotundatis, basi rotundata, angulis posticis obtusis parum distinctis; elytris thorace vix latioribus parcius profunde punctatis. Long. 2·25 mm.

Santa Catalina Island, California; five specimens in bad condition. Much smaller than P. aenescens, with the thorax less transverse, and the sides gradually converging, and less rounded before the middle.

The erect hairs are nearly all rubbed off in the specimens before me, but I think that the species belongs to the present group.

23. P. grandiceps, elongatus, æneo-niger, pube subtili cinerea minus dense vestitus, pilis nigris erectis intermixtis, capite magno, antice depresso lævi, inter oculos convexo parce punctulato, pone oculos punctato; thorace capite paulo angustiore, latitudine sesqui breviore, apice truncato, basi late rotundata, lateribus modice rotundatis, angulis posticis obtusis indistinctis; elytris thorace vix latioribus, sat dense profunde punctatis. Long. 5 mm.

Middle California; one specimen given me by Mr. Uike. As usual, the under surface is densely clothed with cinereous hair; the large size of the head enables this species to be recognized at first sight.

24. P. pedalis, elongatus, nigro-æneus, pube subtili cinerea sparse vestitus, pilis nigris erectis intermixtis; capite thoraceque parce punctulatis, hoc latitudine breviore, lateribus rotundatis, basi late rotundata, angulis posticis obtusis fere indistinctis; elytris thorace haud latioribus, fortiter punctatis et transversim subrugosis; antennarum articulis 2—4 piceis, pedibus ferrugineis vel piceis. Long. 3·5—4 mm.

Santa Catalina Island, California. This species has the usual form, the thorax being more than one-third wider than the head, and resembles in appearance P. Tejonicus; it is distinguished by the red or brown feet, and the more strongly rounded sides of the thorax. In the specimens with dark feet the tibiæ and tarsi are paler than the femora, which are sometimes nearly black; such specimens may be distinguished from P. conformis by the finer cinereous pubescence and the more strongly punctured elytra, and from P. aenescens by the thorax being as wide as the elytra.

25. P. texanus, elongatus, nigro-æneus, pube cinerea elongata minus subtili laxe vestitus, pilis longis nigris erectis intermixtis, capite thoraceque minus subtiliter punctatis, hoc latitudine breviore, lateribus fortiter rotundatis, basi late rotundata, medio subemarginata, angulis posticis obtusis rotundatis; elytris fortiter punctatis, antennis piceis, articulis 2—4 pallidioribus, pedibus ferrugineis. Long. 3·5 mm.

Two specimens, Texas. Differs from all the preceding species of this group

by the stronger punctuation of the head and thorax. The form is about the same as that of the preceding; the antennæ are shorter than the head and thorax, with the third joint slender, and the fourth not as wide as the fifth.

26. P. rufipennis. *Dasytes ruf.* Lec., Proc. Acad. Nat. Sc. Phila., 1858, 71.

Arizona, Mr. Schott, one specimen. Much larger (6 mm.) than any of the preceding, and remarkably different, by the elytra being rufous, and as finely punctured as in P. suturalis. The thorax is equably, tolerably strongly punctured, very little narrower than the elytra, wider than long, much rounded on the sides, broadly rounded at base, with the hind angles obtuse, rounded and not distinct. The scutellum and a small portion of the suture are black. The erect hairs and pubescence are in great part wanting, but enough remains to show that both are cinereous. The feet are rufous, and the anterior tibiæ are armed with a very distinct row of spines on the outer side. The antennæ are wanting in the unique specimen before me.

27. P. serricollis, niger nitidus, pube pallida parca elongata vestitus, pilis erectis nigris pallidisque intermixtis, capite modice punctato, thorace rotundato, convexo, fortiter, medio parce punctato, lateribus denticulatis, basi latius rotundata; elytris thorace haud latioribus fortiter sat dense punctatis, rufo-testaceis; antennis nigro-piceis pedibus rufis. Long. 5·5 mm.

Two males, New Mexico and Colorado. The sixth ventral segment is not excavated. Of the same size as P. rufipennis, but quite distinct by the form of the thorax, which is but little wider than its length, very much rounded at the sides and apex, and more broadly rounded at the base, with the hind angles not very distinct. The sides are strongly serrate, especially in front of the middle. The black hairs are long on the thorax, but on the elytra the pubescence is intermixed with pale erect hairs, only a few black ones being seen.

27. P. serrulatus, nigro-virescens subnitidus, pube brevi albida minus dense vestitus, pilis erectis nigris intermixtis, capite thoraceque modice punctatis, hoc latitudine paulo breviore, antrorsum angustato, apice rotundato, basi late rotundata, angulis posticis haud distinctis, lateribus serrulatis late rotundatis; elytris sat dense punctatis, transversim subrugosis; antennis nigro-piceis, ad thoracis medium extensis, extrorsum incrassatis, femoribus piceis, tibiis tarsisque testaceis. Long. 4 mm.

Arizona, Dr. Irwin, U. S. A. The joints of the antennæ 4—10 are gradually wider and obtusely rounded at tip. The spines on the outer margin of the anterior tibiæ are distinct, but less prominent than in the preceding species.

LISTRUS Motsch.

The chief difference between this genus and the preceding is to be found in the anterior tibiæ, which have not any spines on the outer margin. The appendages of the claws are broad, as long as the claws themselves and connate with them almost to the tip; in this as well as in the form of the palpi and antennæ it agrees with Pristoscelis; the thorax is scarcely one-half wider than the head, and is always serrate and fimbriate at the sides; the pubescence is uniform in texture, without any intermixed erect hairs.

The characters correspond with those ascribed to the European genus Lobonyx, in the works of DuVal and Kiesenwetter, except that the antennæ are distinctly serrate, with the eleventh joint oval and not constricted at the middle.

The sexual characters are not observed in the anterior tarsi as in Lobonyx, but in the fifth and sixth ventral segments, which are more or less foveate or excavated in the male.

The species in my collection may be separated as follows:

Elytra with denuded spots or bands:
  Feet black:
    Thorax wider than long, narrowed in front:
      Elytra with denuded fasciæ..... 1. Motschulskii.
      Elytra with denuded spots..... 2. interruptus.
    Thorax not wider than long:
      Pubescence long:
        Bands of elytra angulated..... 3. canescens.
        Bands of elytra transverse..... 4. difficilis.
      Pubescence very short, denuded spots indistinct..... 5. rotundicollis.
  Feet testaceous..... 6. luteipes.
Elytra uniformly pubescent, without denuded spots:
  Feet black; thorax not transverse:
    Pubescence fine and short..... 7. obscurellus.
    Pubescence long and dense..... 8. senilis.

1. L. Motschulskii, elongatus, æneo-niger, pilis pallidis longis sericeis irregulariter vestitus, maculis denudatis variegatus, thorace latitudine breviore, antrorsum angustato, apice truncato, lateribus valde rotundatis serratis, basi fortiter rotundata; elytris thorace vix latioribus fortiter punctatis, transversim subrugosis, fasciis curvatis denudatis ornatis; antennis pedibusque nigris. Long. 4 mm.

Dasytes canescens‡ Lec., Proc. Acad. Nat. Sc. Phila., vi. 170.

Middle California, abundant; Oregon. I take pleasure in naming this species after Col. Motschulsky, who has mentioned, Bull. Mosc. 1859, 391, the error I committed in referring it to the species described by Mannerheim. It differs by the more robust form, larger size, more transverse thorax and more densely punctured elytra.

In the male the sixth ventral segment is prominent, but not excavated, the fifth is not excavated. In the female the sixth ventral segment is not visible.

2. L. interruptus, elongatus æneo-niger, pilis pallidis longis sericeis irregulariter vestitus, thorace latitudine paulo breviore, antrorsum angustato, apice truncato, lateribus valde rotundatis serratis, basi fortiter rotundata; elytris thorace paulo latioribus, fortiter punctatis, transversim subrugosis, fasciis denudatis interruptis ornatis; antennis pedibusque nigris, illis articulo 2ndo piceo. Long. 3·75 mm.

One pair. Nebraska, Mr. Ulke; one specimen, Santa Cruz Island, California, Mr. C. M. Bache. I should hesitate to consider this as distinct from the preceding, but for the sexual characters. The fifth ventral segment of the male is broadly emarginate, clothed behind with velvety black hairs, and the sixth segment is prominent and concave.

The only differences I can find between this and L. Motschulskii are: the thorax is a little more convex and less transverse, the elytra comparatively a little wider, and the denuded fasciæ are interrupted so as to form spots; and the second joint of the antennæ is piceous.

3. L. canescens *Motsch.*, Bull. Mosc. 1859, ii. 391. *Dasytes can.* Mann., Bull. Mosc. 1843, 247.

Middle California; for authentic types of this species I am indebted to Col. Motschulsky. The thorax is nearly round, serrate on the sides, the denuded bands of the elytra are not interrupted into spots, and the antennæ are entirely black. The fifth ventral segment of the male is deeply excavated, emarginate and clothed behind with black velvety hair, the sixth segment is prominent and concave The antennæ are described by Mannerheim as rufo-testaceous at base, but they are entirely black in the specimens sent by Col. Motschulsky.

4. L. difficilis. *Dasytes diff.* Lec., Pr. Acad. Nat. Sc. Phila., vi. 170.
San Jose, California. This species is narrower than L. Motschulskii or interruptus, and of the same form as the preceding, from which it differs by the band behind the middle of the elytra being broad and scarcely angulated. The sixth ventral segment is visible in both sexes, but in the male the fifth is marked with a deep rounded medial fovea.

5. L. rotundicollis. *Dasytes rot.* Lec., Pr. Acad. Nat. Sc. Phila., vi. 170.
San Jose, California. Differs from all the preceding by the pubescence being much shorter and less unequally distributed, so that the spots on the elytra become obsolete. The thorax is scarcely wider than long, narrowed in front, moderately rounded and serrate on the sides, broadly rounded at the base; the elytra are slightly wider than the thorax, and somewhat more coarsely punctured than in the foregoing species. The sixth ventral segment is visible in both sexes, but in the male the fifth segment is excavated nearly to the base, and the excavation is fringed with black velvety hairs, and the sixth segment is depressed in the middle.

6. L. luteipes. *Dasytes lut.* Lec., Pr. Acad. Nat. Sc. Phila., vi. 170.
Southern portion of California; San Diego, Fort Tejon. The feet and antennæ are ferruginous, the outer joints of the former are fuscous. The thorax is as long as its width, moderately rounded at the sides, which are serrate as usual; the elytra are a little wider than the thorax, strongly punctured, with the spots near the base smaller, and the transverse bands wider than in the other species; the pubescence is long and coarse. I observe no sexual character in the four specimens in my collection.

7. L. obscurellus. *Dasytes obsc.* Lec., Proc. Ac. Nat. Sc. Phila., vi. 170.
One specimen, San Diego; a strongly punctured species, very short hoary pubescence; the thorax is rounded, convex and finely serrate at the sides; the elytra are wider than the thorax and more convex than usual. The description of L. punctatus *Motsch.*, l. cit. 390, agrees with my specimen, except that the antennæ and feet are entirely black; while in the description cited the second and fourth joints of the antennæ, the tip of the tibiæ, and the tarsi are stated to be "plus minusve testaceo-piceis."

8. L. senilis. *Dasytes senilis* Lec., Proc. Acad. Nat. Sc. Phila., vi. 170.
Kansas, New Mexico, Texas. The sixth ventral segment is visible in both sexes; the fifth in the male is feebly truncate, with a narrow fringe of velvety black hair behind at the middle.

DOLICHOSOMA Stephens.

I refer to this genus two species in which one claw is furnished with a connate appendage as long as itself, and free only at the tips, and the other with a short appendage, rounded at tip, leaving the outer half of the claw free. The second species shows a character not observed in any Pristoscelis or Listrus; the thorax each side about half way between the middle and the lateral margin is marked with a distinct longitudinal line.

1. D. foveicollis. *Dasytes foveicollis* Kirby, Fauna Bor. Am. iv. 243.
Nebraska, near the Rocky Mountains, and northwards. A slender, dark blue species of large size, having the third joint of the antennæ triangular, and nearly as large as the fourth, which is equal to the fifth. The pubescence is very fine, cinereous and sparse, intermixed with erect black hairs. The sixth ventral segment is prominent in both sexes; the fifth is broadly emarginate at tip, and excavated in the male, the excavation being bounded by an elevated ridge each side.

2. D. nigricornis. *Pristoscelis nigr.* Bland, Pr. Ent. Soc. Phila.
Kansas and Nebraska, Mr. Ulke. A small species of blackish bronze color,

clothed with prostrate cinereous hair; the thorax is more than one-half wider than long, and considerably rounded at the sides, which are distinctly serrate; the antennæ are black, with the third and fourth joints triangular, but a little narrower than the fifth. The thighs are piceous, the tibiæ and tarsi paler. I should have referred this species to Listrus, but for the fact that the appendage of the outer claws is as long as the claw itself, and entirely connate, while that of the inner claw is about two-thirds as long, obtusely rounded at tip, leaving the tip of the claw free.

ALLONYX Lec.

This genus agrees in character with Dolichosoma, except that the outer claw is slender, with a feeble dentiform dilatation at base: the inner claw is furnished with a broad obtusely rounded appendage connate almost to the point of the claw* in the first species, and entirely masking the point in the second. The mandibles are acute at tip. The antennæ are shorter than the head and thorax, feebly serrate, with the third and fourth joints nearly cylindrical, and narrower than the fifth. The thorax is marked with a deeply impressed transverse line near the base, which bends forward each side, and extends to the apex, forming thus a longitudinal furrow, about one-third distance from the lateral margin. The sixth ventral segment is prominent and impressed in both of the specimens before me.

1. A. sculptilis *Lec.*, Class. Col. North America, 193. *Dasytes sculptilis* Lec., Proc. Acad. Nat. Sci. Philada., 1859, 75.

One specimen. Fort Tejon, California; Mr. Xàntus. The pubescence is very fine and sparse; the thorax transverse, not narrowed in front, sides rounded in front, sinuate behind, with the hind angles rectangular and prominent. The elytra are nearly parallel on the sides, and the tip is broadly rufo-testaceous; the antennæ, palpi and legs are rufo-testaceous, the hind femora blackish at tip; the palpi are also blackish at tip; the inner claw is free at tip. Somewhat resembles a small Trogosita in appearance.

2. A. plumbeus, elongatus, plumbeo-niger, opacus, pube cinerea longa depressa dense vestitus, capite plano punctulato, sulculo supraoculari brevi insculpto; thorace capite paulo latiore, latitudine vix breviore, a basi antrorsum subangustato, apice truncato, lateribus subsinuatis, basi medio truncata, utrinque oblique sinuata, angulis posticis rectis, alutaceo et punctulato, linea profunda utrinque versus latera insculpto; elytris postice paulo dilatatis, confertim punctulatis, pone basin oblique profunde impressis; labro, antennarum mandibularumque basi, pedibusque ferrugineis, palpis totis nigris; ungue interno apice haud libero. Long. ·16.

One specimen from Colorado, given me by Dr. S. Lewis. Quite different in appearance from the preceding. It is possible that dissection would indicate a relationship between this genus and Danacea of the other continent; but the want of sufficient material prevents me from making the investigation.

DASYTES Fabr.

In this genus are to be included the following species, which, although differing in appearance, agree in having the tarsal claws similar in form, acute at tip, and armed with a basal dilatation, or a rounded lobe shorter than the claw itself. The sixth ventral segment is prominent in both sexes. Our species may be arranged as follows:

Thorax with a deeply impressed lateral line.

Basal dilatation two-thirds as long as the claws..... 1. hudsonicus.

Basal dilatation one-half as long as the claws..... 2. breviusculus.

* By a typographical error in the table of genera (Class. Col. N. Am., 193) the appendage of the claw is described as "narrow, and free almost to the base." The line defining Allonyx should not have been indented.

Thorax without lateral lines; basal dilatation of claws dentiform:
Elytra with denuded black bands..... ..... 3. seminudus.
Elytra equably pubescent:
Sides of thorax broadly rounded..... 4. pusillus.
Sides of thorax strongly rounded..... ..... 5. catalinæ.

1. D. hudsonicus, elongatus, ater, pube subtili cinerea parce vestitus, pilis brevibus erectis nigris intermixtis, capite subopaco rugose punctato; thorace subtilius punctato, latitudine breviore, a basi antrorsum angustato, apice truncato, lateribus subbisinuatis, basi late rotundata, angulis posticis rectis, linea arcuata utrinque profunda impressa, ad basin ambiente minus profunda; elytris thorace paulo latioribus, subtiliter punctatis et transversim subrugosis. Long. 4 mm.

One male collected in Hudson Bay Territory by Mr. R. Kennicott, given me by Mr. Ulke. The antennæ are as long as the head and thorax; the second joint is as long as the third; the third is narrower than the fourth, which is triangular and equal to the fifth. The ungues at the base are dilated into an obtuse rounded lobe, which leaves only one-third of the claw free. The sixth ventral segment is prominent, and deeply excavated.

This species would be quite as well placed in Group III of Pristoscelis, except that no spines are visible on the outer side of the anterior tibiæ; the general appearance, as well as the sculpture of the thorax, indicate an affinity with the next species, from which it differs by the finer punctuation and pubescence, and by the sides of the thorax being slightly bisinuate, feebly angulated at the middle, and not serrate.

2. D. breviusculus *Motsch.*, Bull. Mosc. 1859, ii. 396.

One female, California; given me by Mr. A. Murray. My specimen differs from that described by Col. Motschulsky in having the antennæ and feet of a uniform black color; but as will be seen in the descriptions of other species of this tribe, these characters are not constant, and I therefore consider the specimen before me as belonging to his species. The pubescence is coarser than in the preceding, and the black hairs are not very obvious; the thorax is more sparsely and quite finely punctured at the middle, and more rugosely at the sides, which are broadly rounded and slightly serrate; the elytra are less finely punctured; the ungues are armed with a lobe, which is obliquely truncate at tip, and leaves one-half of the claw free.

Two specimens from Nebraska, given me by Mr. Ulke, differ from the Californian specimen by the sparse punctures of the middle of the thorax being less fine. I am unwilling to regard them as indicating a distinct species.

3. D. seminudus, elongatus, niger, pube cinerea vestitus, capite thoraceque, sat dense subtilius punctatis, hoc latitudine sesqui breviore, convexo, lateribus rotundatis subserratis, fimbriatis, basi late rotundata, angulis posticis obtusis; elytris subtilius punctatis, transversim subrugosis, basi anguste, fascia media lata apiceque densius cinereo-pubescentibus; pedibus nigro piceis, unguibus dente lato armatis, dimidio externo liberis. Long. 2·5 mm.

Variat antennarum articulis 2 et 3, tibiisque piceo-testaceis vel piceis.

Two females from Middle California, in the collection of Mr. Ulke, are before me; in one the antennæ and feet are almost black, in the other the second and third joints of the antennæ and the tibiæ are much paler.

4. D. pusillus *Lec.*, Proc. Acad. Nat. Sci. Phila., vi. 170.

San Diego, California; a small coarsely pubescent species, having the thorax nearly twice as wide as its length, moderately rounded and finely serrate on the sides; the elytra are coarsely punctured; the second, third and fourth joints of the antennæ and the legs are ferruginous in one specimen; but in three others the antennæ are entirely black, and the feet, especially the hind thighs, are dark.

Several badly preserved specimens from Sta. Catalina Island agree in sculpture, but the sides of the thorax are much more rounded, the legs are nearly black, and the elytra are less coarsely punctured. It is a little smaller, being 1·6 mm. long. It may be named D. c a t a l i n æ.

The dilatation of the claws in both species is broad, and about half as long as the claw.

ESCHATOCREPIS Lec.

In this genus the appendages of the claws are as long as the claws, narrow, rounded at tip, and free quite to the base. In this respect it agrees with the European genus H a p l o c n e m i s, but differs by the antennæ being scarcely serrate, gradually thickened externally, with the fifth joint, as in several species of P r i s t o s c e l i s, slightly wider than the contiguous joints.

The thorax is not wider than long, feebly rounded on the sides from the base nearly to the tip, where they are slightly sinuate, thus rendering the anterior angles somewhat prominent; the disc is feebly channelled, and marked each side with a deep impressed line extending from the tip to the base.

1. E. c o n s t r i c t u s *Lec.*, Class. Col. North America, 193. *Dasytes constrictus* Lec., Proc. Acad. Nat. Sci. Phila., vi. 170.

Variat pedibus obscuris: *Listrus constricollis* Motsch., Bull. Mosc., 1859, ii. 390.

San Diego, and Fort Tejon, California. The fifth ventral segment of the male is marked with a small rounded impression near the tip.

MELYRIS Fabr.

The only two North American species known to me are of small size, very coarsely punctured, without elevated costæ on the elytra.

1. M. b a s a l i s *Lec.*, Class. Col. N. America, 93. *Dasytes basalis* Lec., Proc. Acad. Nat. Sci. Phila., vi. 171.

One specimen, Georgia.

2. M. c r i b r a t u s *Lec.*, loc. cit. *Dasytes cribratus* Lec., Proc. Acad. Nat. Sci. Phila., vi. 171.

Middle and Southern States.

I have not identified the following species:

Dasytes p a r v i c o l l i s *Mannh.*, Bull. Mosc., 1843, 248.

Listrus t i b i a l i s *Motsch.*, ibid, 1859, ii. 391.

Trichochrous c a l i f o r n i c u s *Motsch.*, ibid, 1859, ii. 393.

Trichochrous c y l i n d r i c u s *Motsch.*, ibid, ibid.

Additions to the COLEOPTEROUS FAUNA of the United States. No. 1.

BY JOHN L. LECONTE, M. D.

It is my intention, from time to time, to publish descriptions of the new species which have been obtained too late for insertion in the "List of the Coleoptera of North America," and the "New Species of North American Coleoptera," in course of publication by the Smithsonian Institution. As the parts of those two works now in print treat of the same families as are contained in Part I. of the "Classification of the Coleoptera of North America," published by the Institution, the papers of this series will be confined within the same limits. Any interesting discoveries in the succeeding families, in which the penultimate joint of the tarsi is connate with the last joint, (Tetramera and Trimera of the Latreillean method,) and in the Rhynchophora, will be deferred, or made known only in faunal memoirs.

The descriptions of individual members of genera and families are in the

present state of progress of Entomology very undesirable; the complication in bibliography and the difficulty of reference being sources of greater injury than the advantage resulting from the knowledge of the species thus published. And the motives which induce me, on the present occasion, to violate my well-established opinions of what is best for the interests of science are; first, the number of genera not previously represented in our territory; and secondly, by numbering the papers in a regular series, to render them really supplements to the "List" and "New Species" above mentioned. At the same time I shall rigidly exclude from this series any species which can be described in any monographic or faunal memoir which may soon be elaborated. Varieties or races of described species which have not been previously noticed in print will also be mentioned.

Since the publication of my last descriptions of Coleoptera, the metrical system of weights and measures has been adopted and authorized by the Government of the United States. The measurements used in the present series are millimetres, and can be converted approximately into hundredths of an inch, (the measure used in my previous memoirs,) by multiplying by four.

CICINDELA Linn.

1. C. obsoleta *Say*. A remarkable variety, or rather race, of this species was collected at Fort Whipple, Arizona, by Dr. E. Coues, U. S. A. It is of large size, (19 mm.,) dark blue color, tinged with green, the thorax less flattened than in race prasina, but less convex than in race vulturina, with the pale markings of the elytra perfect, as in the best developed specimens of the latter: viz., a humeral spot, a submarginal spot before the middle, a medial band not attaining the margin, composed of two spots connected by an oblique line, an apical lunule, consisting of a terminal margin dilated into a spot anteriorly about one-fifth of the length of the elytra; the legs and under surface are dark blue, with the last ventral segment black.

2. C. longilabris *Say*. A variety of this species occurs in Colorado, in which the color above is dark brown slightly bronzed, the humeral lunule entire, connected with the medial band by a narrow submarginal white line, and the apical lunule entire and dilated anteriorly into a large spot. The under surface and legs, as usual, are blue green. For a specimen I am indebted to Dr. S. Lewis.

3. C. nigrocœrulea *Lec.* Mr. Ulke has a specimen of this species, from Colorado, in which the color above is dull leek-green, and the elytra are immaculate.

4. C. rufiventris *Dej.* Chaudoir (Cat. Coll. Cicindélites, 1865,) considers *C.* 16-*punctata* and *C. cumatilis* as varieties of this species.

5. C. dorsalis *Say*. Chaudoir (loc. cit.) regards *C. media* Lec. and *C. Saulcyi* Guérin as varieties of this species. I have in the list already placed the former as a race of C. dorsalis, but the much smaller size, and the less development of the tooth on the right mandible of the male, seem to establish the specific nature of C. Saulcyi.

6. C. repanda *Dej.*. C. 12-guttata *Dej.* is placed by Chaudoir as a variety of this species.

7. C. obliquata *Kirby*, as I learn from a drawing made by Mr. Andrew Murray, from the type in the British Museum, is quite distinct from any species known to me. The annexed wood cut will show the character of the markings better than any description. The species should hereafter be known as C. Kirbyi.

8. C. formosa *Say*. Chaudoir regards *C. generosa* Dej. and *venusta* Lec. as being varieties of this species.

9. C. rugifrons *Dej*. Besides the races indicated by me in the List, Baron Chaudoir places as a *variety* of this species C. scutellaris. From this view I must dissent, regarding the finely and densely rugous prothorax of the latter as constituting an essential difference between the two.

10. C. rectilatera *Chaud*., Bull. Mosc., 1843, 693, is the species found in Texas which I erroneously considered as C. decostigma, and subsequently proposed to name C. texana (List, p. 1).

11. C. purpurea *Oliv*. Chaudoir places C. splendida as a variety of this species.

12. I learn from Mr. Sallé, as well as from Baron Chaudoir's Catalogue, that the species described by me, Tr. Am. Phil. Soc. xi. 62, as C. viatica *Chevr*., is different from that species. It may be called, from its locality, C. pimeriana.

BLETHISA Bon.

B. multipunctata *Dej*., Sp. Gen. ii. 266. A specimen which, on close comparison with European specimens, shows no difference, was found at Ottawa, C. W., and presented to me by Mr. B. Billings. Two others from the neighborhood of Chicago are in the collection of Mr. Ulke.

NEBRIA Latr.

N. obliqua, alata nigra, thorace longitudine duplo latiore postice angustato, lateribus antice rotundatis, postice obliquis haud sinuatis, basi truncata, angulis posticis obtusis haud rotundatis, canaliculato, antice profunde transversim impresso ad basin fortiter impresso et parce punctato; elytris oblongis, thorace latioribus, striis subpunctatis, 3io puncto pone medium impresso: antennis palpis tarsisque piceis. Long. 11 mm.

Colorado. I have seen two specimens belonging to Dr. S. Lewis, one of which he has generously placed in my collection. In form this species resembles N. moesta, but the sides of the thorax are not sinuate near the base, the hind angles, though well marked, are not rectangular but obtuse, the elytra are less convex, and the third interval has but *one* impressed puncture, which is on the third stria, about one-fourth from the tip.

CYCHRUS Fabr.

C. Guyotii, æneo-niger, thorace latitudine haud longiore, postice valde angustato, lateribus anguste fortiter marginatis, disco rugoso postice punctato; elytris ovalibus convexis, anguste marginatis, dense crenato-striatis. Long. 27 mm.

LeConte, List of the Coleoptera of North America, p. 58, (1st issue, 1863). One specimen collected among the Black Mountains of North Carolina, was given me by Prof. A Guyot. A remarkable species, resembling in its characters C. Andrewsii, but as large as C. viduus.

The specimen is a female, and on comparison with the same sex of C. Andrewsii, it is found to differ not only in size and by the more coarse punctures of the base of the thorax, but also by the labrum being less elongate, the lobes less slender, the emargination more broadly rounded, and not extending so near to the base as in that species; the sides of the thorax are distinctly angulated near the middle.

DYSCHIRIUS Bon.

D. obesus, rufo-testaceus parum nitidus, epistomate late emarginato, alis rotundatis, thorace latitudine breviore ovato, antice parum angustato; elytris

fuscis æneascentibus, fere obsolete striatis, subovatis thorace haud latioribus, apice late subtruncatis. Long. 6·5 mm.

Le Conte, List of the Coleoptera of North America, p. 58, (1st issue, 1863). One specimen, collected near San Francisco, California, given me by Dr. G. H. Horn. This species is related to D. marinus *Lec.*, but is much stouter in form; the thorax is comparatively larger, and the elytra more obviously subtruncate.

The publication of subsequent pages of the work, in which the descriptions of this and the preceding species first appeared, has caused the page above quoted to be cancelled, and I have therefore rendered any future reference to it unnecessary by transferring them to the present memoir.

APENES Lec.

A. nebulosa, depressa picea, opaca, capite thoraceque confertim rugosis et subtiliter punctatis, hoc latitudine sesqui breviore canaliculato postice angustato, angulis posticis obtusis distinctis, basi sinuatim rotundata; elytris thorace sesqui latioribus, striis impunctatis, interstitiis planis, 3io bipunctato, fuscis, limbo lato fasciisque duabus obliquis obscure testaceis; abdomine testaceo, antennis palpis pedibusque pallidioribus. Long. 6·5 mm.

Cape San Lucas, Lower California; Mr. Xàntus Of the same size as A. sinuata, but quite different in color, lustre and sculpture. The elytra are rather broader than in the other species, and the oblique pale bands are not very distinct; the anterior one runs backwards towards the suture, and the posterior one runs forward, producing a resemblance to the markings in some Bembidia of the group *Notaphus*. The antennæ are scarcely as long as the head and thorax united; the claws are feebly pectinate, each being armed with two to three teeth. The rugosities of the head are longitudinal, and quite densely placed, with some intermixed punctures.

RHOMBODERA Reich.

R. bicolor *Lec.* I have two specimens from Illinois, which differ from the type by having the head black; they are thus intermediate in color between R. pallipes, in which the head and thorax are black, and R. bicolor, in which both are yellow. I prefer regarding all as belonging to one species.

PTEROSTICHUS Bon.

P. superciliosus. *Feronia superc.* Say, Journ. Acad. Nat. Sci. Phila., iii. 144, ed. Le Conte, ii. 92.

A specimen from West Virginia, 15 mm. long., given me by Dr. S. Lewis, differs from P. moestus in having the thorax less narrowed behind, the hind angles more broadly rounded and feebly carinate; the basal impressions finely punctured, separated from the reflexed margin by the feeble carina just mentioned; the elytra are much less obtuse behind, shining, (at least in the male,) deeply striate and tinged with purple; the third interval has four punctures, as in P. moestus. The outline is nearly the same as in P. stygicus, but the thorax is somewhat more narrowed behind.

In Say's description of *Feronia superc.* the base of the thorax is said to be "wider than the petiole," and in the description of *F. moesta*, "not wider than the petiole." The descriptions otherwise accord with each other, and the other distinctive characters between P. moestus and the specimen before me are not mentioned; yet, as the original types of *F. superciliosa* are destroyed, I prefer rather to adopt the name than to regard the species under consideration as a nondescript.

The form and sculpture of the thorax is nearly the same as in P. protensus *Lec.*, (New Species of N. Am. Col., 12,) but the form in that species is more elongate, the elytra are more deeply striate, not tinged with purple, and there are but two dorsal punctures.

SELENOPHORUS Dej.

S. subtinctus, elongato-oblongus, niger nitidus, thorace capite parum latiore latitudine breviore, postice angustato, angulis posticis obtusis haud rotundatis, margine laterali piceo, ad basin utrinque vage impresso, punctulato; elytris iridescentibus, thorace paulo latioribus, striis profundis, ad apicem magis exaratis, 2da punctis 6—8 parvis impressis, 5ta punctis 3 vel 4 parvis parum distinctis, antennis palpis pedibusque testaceis. Long. 6·5 mm.

Louisiana; one specimen given me by Mr. Ulke. Allied to S. iricolor, but smaller and narrower, with the hind angles of the thorax not at all rounded, and the base each side strongly punctulate.

HYDROPORUS Latr.

H. obesus, rotundatus convexus, postice acutus, subtiliter reticulatus, parce subtiliter punctulatus, piceus, capite, thoracis lateribus, elytrorum fasciis et lineolis pedibusque pallidis; epistomate haud marginato, occipite obscuro, thorace utrinque linea arcuata ad basin extensa impresso, elytris utrinque subtiliter biseriatim punctatis; antennis extrorsum, tarsisque piceis. Long. 3 mm.

One male, California, Mr. Ulke. Of the same size and form as H. punctatus and cuspidatus, but rather more obtuse in front, and very distinct by the epistoma not being margined in front, and by the thorax each side being marked with a deep curved line, concave inwards, extending from the middle to the base. This line is twice as distant from the middle as from the side, and meets the base at an obtuse angle. The pale markings of the elytra consist of a basal band, another behind the middle, and an apical spot; the bands are composed of short lines more or less confluent, and are dilated at the margin into larger spots; the epipleuræ are testaceous; the usual lines are composed of small crowded punctures, the surface is finely reticulate, and towards the suture small sparsely scattered punctures are visible, which become obsolete towards the sides.

H. 12-lineatus *Lec.* and H. scitulus *Lec.* are the only other species in my collection having the thorax similarly impressed, but the lines in them are less acutely defined, and the body is not rounded.

H. vitiosus *Lec.* A male specimen from Texas, sent me by Mr. Sallé, agrees in form and arrangement of colors with the female type from Illinois, but differs by the punctuation, which is quite strong, and not dense, nearly as in the male of H. oppositus. The agreement in other respects is so complete that I would not be justified in regarding it as belonging to a different species.

H. sellatus, ovalis convexus, modice elongatus, nitidus, subglaber, capite nigro-piceo subtiliter haud dense punctato, ore maculaque occipitali testaceis, thorace testaceo, apice infuscato, basi late piceo, profunde punctato, lateribus obliquis rectis, cum elytris (lateraliter visis) angulum valde obtusum formantibus; elytris pallidis, profunde sat dense punctatis, punctis majoribus versus suturam et in vitta dorsali parum distincta digestis, sutura, lineolis paucis, plagaque postica irregulari subsuturali maxima nigris; subtus niger, rude punctatus, pedibus testaceis, antennarum apice femoribusque infuscatis. Long. 3·5 mm.

One specimen from Dacota, given me by Mr. Ulke. This species has the same size and nearly the same form and sculpture as H. suturalis *Lec.*, but is more equally attenuated in front and behind, and the punctures of the elytra are somewhat finer and more dense; the pale yellow elytra, with the large black posterior spot, will enable it to be easily recognized. The spot extends from before the middle to within a short distance of the tip, and from the suture three-fourths way to the sides; the anterior outline is formed by the confluence of two short lines, and the exterior outline is lobed; the whole suture is black-

ish, and the same color extends along the inner portion of the base; a small discoidal brownish line is seen before the middle, and nearer the side than the suture; the punctures are tolerably dense and deep, and in the position of the usual lines are seen a few scattered larger punctures; the epipleuræ are pale. The body beneath is very coarsely punctured, as in H. suturalis and allied species.

COLYMBETES Clairv.

C. notatus *Sturm.* *Dytiscus not.* Fabr. I have a male specimen, found in Montana, which agrees with the figures and descriptions of this common European species. The head is black, with the front part and two spots on the vertex pale. The thorax is pale, with a transverse medial black spot; the basal and apical edge are narrowly margined with black; the sides are rounded and do not form a perceptible angle with the outline of the elytra. The elytra are pale, thickly and coarsely irrorate with black, leaving the suture and two almost obsolete lines on each pale; scutellum black. Body beneath black, legs, prosternum, abdominal sutures and large apical spot testaceous. This species is smaller and more convex than C. binotatus, and on account of the broadly rounded sides of the thorax is more obtusely rounded in front, more parallel on the sides, and more acute behind. The ungues of the anterior and middle feet are very unequal, the inner one being one-half the length of the outer one, which on the front feet is nearly straight.

C. tostus, elongato-ovalis, modice convexus, antice paulo magis obtusus, capite nigro antice pallido, vertice immaculato; thorace testaceo, nebula media basique infuscato, lateribus late rotundatis; elytris lateribus subparallelis, confertim minus subtiliter nigro-irroratis, sutura antice lineisque utrinque duabus abbreviatis parum distinctis pallidis relictis; subtus piceo-ferrugineus, pedibus prosternoque pallidioribus. Long. 11 mm.; lat. 5·5 mm.

Mas unguiculis anterioribus elongatis subæqualibus, fere rectis.

Femina elytris a basi ultra medium longitudinaliter profunde sat dense aciculatis.

A male from North Red River, and a female from Idaho. This species has nearly the form of the preceding, but is less convex; and is easily known by the absence of the vertical spots, and by the color of the under surface. The inner claw of the front tarsi of the male is scarcely shorter than the outer one; they are slightly sinuous, but nearly straight.

HELOPHORUS Fabr.

H. fortis, elongato-oblongus, subtus nigro-piceus, supra fusco-testaceus nitidus, capite virescente, punctato; thorace parce punctato, versus latera parce granulato, latitudine sesqui breviore, postice paulo angustato, lateribus late rotundatis, postice subsinuatis, angulis posticis fere rectis, sulcis 5 profundis exaratis; elytris postice fusco et pallido nebulosis, striis profundis fortiter punctatis, interstitiis parce uniseriatim punctulatis; pedibus testaceis. Long. 5—6·5 mm.

San Francisco, Mr. Bolander. Differs from H. oblongus *Lec.* by the thorax being more strongly punctulate, narrowed behind, with the hind angles less obtuse, and by the markings of the elytra forming a little group behind the middle, the angle of which is directed forwards. The granules at the side of the thorax are more distinct, and are marked with a central puncture.

LIMNEBIUS Leach.

L. suturalis, ovalis convexus, niger nitidus, capite thoraceque parce subtilissime punctulatis, hoc lateribus flavis diaphanis, elytris parce subtiliter pubescentibus, stria suturali antice abbreviata, limbo laterali, et apicali flavo diaphano, parce subtiliter, præcipue postice punctulatis; pedibus piceis, antennis basi flavis. Long. 1·5—2 mm.

Mas abdomine elytris paulo longiore, articulis duobus ultimis connatis, fere glabris; 6to triangulari, impresso, 7mo apice rotundato, longe ciliato.

Femina abdomine simplici, elytris haud longiore.

Pennsylvania, New York and Lake Superior. There are five specimens before me. This species differs from the European species, except L. atomus, by the distinct sutural stria, which extends from the tip to within one-third of the base. I have observed no sexual difference in the legs. The last two ventral segments of the male are connate, forming a plate, which is triangularly impressed at the base, but rounded and ciliate with long hairs at the tip.

NECROPHORUS Fabr.

N. Hecate *Bland*, Proc. Ent. Soc. Phila., iv., 382.

Kansas and Colorado. This species resembles in the form of the thorax N. Melsheimeri *Kirby*, but differs by the smaller size, the less finely punctured head and thorax, and by the deeper dorsal channel of the latter; the red markings vary in size, being sometimes as in N. marginatus and Melsheimeri, except that the black extends slfghtly upon the epipleuræ behind the humeri; and sometimes so broad that the two bands become united, leaving only the base, apical margin, small common sutural spot, sutural margin behind the middle, and another small lobed spot near the side, black. The club of the antennæ is entirely ferruginous. Length 11·5—20 mm.

I have received, through the friendly attention of Mr. A. Murray, sketches of the thorax, elytra and antennæ of N. obscurus and hebes *Kirby;* the former does not appear to be different from that which I have recognized as N. Melsheimeri *Kirby;* the hind trochanters are emarginate in the female, but the inner angle is recurved in the male. N. hebes is a species unknown to me, differing from N. marginatus and Melsheimeri by the club of the antennæ being entirely black, and the posterior red band being represented by a large irregular spot, touching neither the side nor the suture; the epipleuræ, as in the species named, are entirely red.

N. confossor *Lec.*, Proc. Acad. Nat. Sc. Phila., vii. 19.

From Oregon. Appears to be a variety of N. maritimus *Mann.*, with very broad markings; the red bands are as broad as in N. marginatus or N. Melsheimeri, from which it differs by the thorax being scarcely narrowed behind, and with a wider depressed margin; the first joint of the antennal club is black, as in N. Melsheimeri, and the hind trochanters of the female are emarginate, while, as in that species, the inner angle of the male is strongly recurved.

N. pygmæus *Kirby.* In the List of Coleoptera of North America I have incorrectly placed this as a synonym of N. mortuorum, from which it differs by the absence of the red spot at the base of the epipleuræ.

N. defodiens *Mann.* seems to be a larger form of N. pygmæus, with narrower markings. I have specimens from Oregon, intermediate in size between the very small Canadian form and the large specimens found in Russian America.

SILPHA Linn.

S. opaca *Linn.* The occurrence of this species in Arctic America, on the borders of Mackenzie and Slave Rivers, is mentioned by Mr. A. White, in Richardson's Arctic Searching Expedition, p. 474. I am indebted to Mr. Ulke for a specimen collected by Mr. Robert Kennicott, in the Hudson Bay Territory.

LEPTINUS Müller.

L. americanus, ovalis depressus, testaceus, confertim subtilius rugose punctatus, pube pallida sat dense vestitus, thorace latitudine breviore antrorsum angustato, lateribus rotundatis, basi late rotundatim emarginata, angulis

posticis subacutis; elytris apice late rotundatis, abdomine paulo brevioribus. Long. ·2 mm.

Keokuk, Iowa, Dr. Brendel. This species agrees with the figures and descriptions of the European L. testaceus, and I have had no opportunity, by comparing specimens, to observe the differences which probably exist.

My object in describing the species is not only to make known the discovery of the genus on this continent, but to call attention to some hitherto unnoticed characters which seems to indicate that its place is not in the family Silphidæ, in which it has been thus far classed.

The head resembles very much that of a Hydrophilide, Philhydrus or Cercyon, for instance, the upper surface being slightly convex, not narrowed anteriorly, but broadly rounded, both on the sides and in front; the labrum is broad, transverse and not prominent, the mandibles do not project; the antennæ are inserted on the under surface of the sides of the front, slender, longer than the head and thorax; the first joint is as long as the two following united, the second is shorter, but scarcely thicker than the third; the outer joints are very slightly thickened; all the joints appear equally opaque and pubescent; the eyes are entirely wanting; the mentum is large, slightly concave, with the hind angles acute, produced backwards over the gula, forming small carinæ; the suture between the mentum and gula is distinct, but not as obvious as usual; the prothorax beneath is quadrately emarginate in front, so that the anterior angles project *under the head;* the anterior coxæ are oval or rounded, not prominent; the cavities are open behind, almost separated by the prosternum, and externally furnished with a narrow fissure, to the end of which the prosternal suture runs; the middle coxæ are small, separated by a narrow carinated mesosternum; the trochantin is visible, and the side pieces extend to it; the hind coxæ are flat, and not very large; the tibial spurs are long and slender, and all the tibiæ are sparsely spinous; the tarsi are all five-jointed, and the fourth joint is slightly oblique beneath, and furnished with a dense brush of hairs; the first joint of the hind tarsi is as long as the three following united; the abdomen is flat, with the sixth joint short, but distinct.

It is to be observed, from the notes given above, that this genus differs from Silphidæ by—1st, the form of the head, and the insertion of the antennæ, 2d, the form of the mentum, 3d, the form and arrangement of the anterior coxæ, 4th, the structure of the fourth joint of the tarsi; all of which are characters of fundamental importance. It agrees with Hydrophilidæ in the form of head, insertion of antennæ, general arrangement of mentum, gula and prosternum, but differs by the regular antennæ, not prominent anterior coxæ, and structure of the fourth joint of the tarsi. The relations with Mycetophagidæ, to which it bears a superficial resemblance, and Cryptophagidæ, are too remote to be worthy of analysis. With Nitidulidæ, especially the genera having large mentum, it might also be considered to have some affinity, but the fourth joint of the tarsi is not small, the anterior coxæ have no trochantin, and their coxal cavities are partially confluent and open behind.

I therefore infer that Leptinus is a highly specialized type, representing a distinct family, having less affinity with Silphidæ than with Hydrophilidæ.

Dr. Brendel observes in a letter, "This insect I found under a log in a mouse nest, in company with fleas; in the neighborhood were yellow ants, of the same kind with which Ceophyllus lives."

ANISOTOMA Ill.

A. conferta, ovalis, convexa castanea nitida, capite thoraceque minus dense subtiliter punctatis, hoc brevi, lateribus magis rotundatis; elytris seriatim confertim punctatis, subtiliter parce obsolete transversim strigosis, stria suturali sola impressa; pedibus testaceis. Long. 3 mm.

Mas tarsis anterioribus articulis 2—4 paulo dilatatis; femoribus posticis

dente parvo apicali inferno recurvo armatis, tibiis posticis elongatis, paulo curvatis. Femina latet.

One specimen, Illinois. This species has the form and almost the sculpture of Hydnobius. It differs from all the other species in my collection by the punctures of the intervals being as large and nearly as close as those of the striæ of the elytra, which thus appear thickly punctured in rows; the transverse rugæ are very fine, and not very distinct; the carina of the mesosternum is finer than usual, but quite distinct.

ANOGDUS nov. gen.

Corpus late ovale, convexum, haud contractile; antennæ 10-articulatæ, articulis 1—2 crassiusculis, 3io triangulari, crassitie vix longiore, 4—6 brevibus, subtransversis, 7—10 valde transversis, clavam laxam magnam, articulis 1—6 paulo longiorem formantibus, 10 angustiore, apice obtuse rotundato: frons apice et lateribus subtiliter marginatus. Mesosternum carinatum, metasternum haud protuberans. Pedes breviusculi, crassiusculi; femora incrassata; tibiæ spinulosæ sensim dilatatæ, calcaribus inæqualibus terminatæ; tarsi antici 5. intermedii 5, postici 4-articulati, articulo 1mo majore.

The species upon which I have established this new genus resembles, in form and sculpture, a broad Anisotoma, but differs by the antennæ having a much larger club, in which the eighth joint is wanting, and the last joint narrower than the preceding. From Cyrtusa it differs by the first joint of the club being as wide as the two following, and by the mesosternum being carinated.

A. capitatus, late ovalis, convexus ferrugineus, nitidus, capite thoraceque sat dense subtiliter punctatis, hoc lateribus subtiliter marginatis fortiter rotundatis, basi immarginata; elytris striis dense subtiliter punctatis, interstitiis sat dense transversim rugose punctulatis, alternis punctis parcis majoribus parum conspicuis, seriatim impressis. Long. 3 mm.

Florida, one specimen. The interior outline of the hind thighs is nearly straight, armed with a minute tooth at the middle, and the apical angle is rounded and prominent. The specimen is probably a male.

CYRTUSA Er.

To this genus belongs Amphicyllis picipennis *Lec.*, New Species, p. 25. I am indebted to Mr. Ulke for specimens, which enable a more careful examination to be made than was possible with the unique type; the hind thighs of the male are armed beneath at the apex, with a large and broad tooth, acute, but not recurved at the tip. It differs from C. egena Lec., not only by size, color and sculpture, but by the legs being less thickened, and by the tarsi being nearly filiform, while in C. egena they gradually diminish from base to tip; the body is also somewhat contractile in C. egena, as in Liodes, but scarcely so in C. picipennis. The eighth joint of the antennæ is not visible in either species.

COLENIS Er.

In C. impunctata *Lec.* the joints of the tarsi are 5, 4, 4; the antennæ distinctly 11-jointed, with the seventh joint wider than the eighth, but smaller than the 9th; the eleventh is elongate, oval and somewhat acutely pointed at tip.

In C? lævis Lec., the tarsi are slender, with the joints 4, 3, 3; the mesosternum is carinated; the eighth joint of the antennæ is scarcely narrower than the seventh; the ninth and tenth are wider and larger, subtransverse; eleventh much larger oval, subacute at tip, and marked beyond the middle by a transverse line; the body is feebly contractile. These characters indicate a genus intermediate between Colenis, and Agaricophagus, for which the name AGLYPTUS may be adopted; it is distinguished from both genera by the upper surface being smooth and impunctured, and by the front being finely margined, both at the sides and anteriorly.

CHEVROLATIA DuVal.

C. amœna, rufa, flavo-pubescens, thorace latitudine longiore, ante medium angustato, basi breviter carinato et utrinque bifoveato, foveis mediis majoribus, elytris fovea basali versus scutellum, plicaque parva humerali notatis. Long. 2 mm.

Washington, D. C., Fort Lee, near New York, Mr. Ulke. Agrees with the description of the European C. insignis *DuVal*, (Ann. Ent. Soc. Fr, 1850, 2d ser., viii. 46,) but differs from the figure by the thorax being less elongated, and more suddenly narrowed from the middle to the apex.

The genus will be easily distinguished among the Scydmænidæ by the narrow body and approximate moniliform antennæ. The elytra are shorter than the abdomen, leaving the pygidium exposed as in EUTHEIA.

I am indebted to the liberality of Mr. Ulke for the second specimen found by him of this remarkable insect.

AGATHIDIUM Illiger.

A. politum, semiglobatile, testaceum nitidum, thorace elytris vix latiore, his vix obsolete punctulatis, stria suturali ad medium antice abbreviata, humeris obtusis rotundatis; sutura frontali nigricante, tarsis crassiusculis. Long. 2·5 mm.

Mas mandibulo sinistro cornu elongato curvato nigricante armato.

One male, York Co., Pa.; Dr. Melsheimer. This species differs from all the other species from the Atlantic States, by the characters given above; it agrees in form and sculpture with the Californian A. pulchrum, but differs from it by the color, and by the tarsi being less slender. A. exiguum, which resembles it in size and sculpture, differs by the wider thorax and more perfect power of contracting into a ball, indicated by the humeral angles of the elytra being more obtuse, and very obliquely truncate.

FALAGRIA Mann.

F. scutellaris, attenuata, nigricans, subtiliter sericeo-pubescens, thorace ovato, latitudine longiore, dense punctulato, profunde canaliculato, scutello canaliculato, elytris convexis haud punctatis, abdomine subtiliter punctato, ano pedibusque testaceis, antennis fuscis. Long. 3·5.

One specimen, Coney Island, near New York. Resembles F. bilobata by the densely punctulate thorax, but differs by the thorax being more narrowed behind, by the scutellum being distinctly channelled, and by the elytra being not punctulate.

F. bilobata, attenuata, nigricans, pube sericante subtili vestita, thorace ovato latitudine paulo longiore, dense punctulato, profunde canaliculato, scutello vix canaliculato, elytris convexis subtiliter punctulatis, abdomine punctulato, ano sæpe testaceo, pedibus testaceis antennis fuscis. Long. 3—4·5 mm.

Aleochara (*Aleodorus*) *bilobata* Say, Tr. Am. Phil. Soc., vi. 156; ed. Leconte, ii. 589

Western States—Illinois, Indiana, Missouri. In this and in the preceding species the head is scarcely punctulate, and the hind angles of the thorax are marked with a large puncture.

F. cingulata, attenuata, picea, tenuiter pubescens, capite antice vix, postice parce punctulato, thorace ovato latitudine longiore, parce punctulato, profunde canaliculato; scutello punctato, subtiliter carinato, elytris parce subtilissime punctulatis; abdomine lævi, segmentis duobus primis piceo-testaceis, reliquis nigris, antennis pedibusque piceo-testaceis. Long. 3—3·5 mm.

New York, Pennsylvania, Illinois. This species has the same form as F. bilobata, but is very different in its sculpture. The very fine carina of the scutellum is visible only under a high magnifier. The anterior dorsal segments of the abdomen, as in all the preceding species, are transversely impressed, with a line of punctures at the bottom of the impression, but the dorsal surface is otherwise smooth.

F. læviuscula, attenuata, picea, subænescens, tenuiter pubescens, capite rotundata, vix parce subtilissime, punctulato, thorace ovato, latitudine longiore, vix conspicue punctulato, profunde canaliculato, mox ante basin transversim impresso; scutello plano et elytris subtilissime punctulatis; abdomine lævi, apice vix punctulato; antennis pedibusque piceo-testaceis. Long. 3·5 mm.

Fort Tejon, California; Dr. G. H. Horn. This species is of the same size and form as F. cingulata, but differs by the much less obvious punctures of the head and thorax, and by the strongly marked transverse impression just in front of the base of the thorax, which is less narrowed behind.

F. quadriceps, depressa, nigro-picea, nitida, subtiliter pubescens, capite magno, basi late truncato, angulis posticis rotundatis, parce punctulato, fovea frontali impresso, occipite breviter canaliculato; thorace trapezoideo, postice modice angustato, latitudine paulo breviore, punctulato, profunde canaliculato; scutello punctulato, haud canaliculato; elytris thorace latioribus, punctulatis, piceo-testaceis; abdomine subtiliter punctulato, piceo; antennis fuscis, basi pedibusque testaceis. Long. 3·5 mm.

One specimen, New York; April, under a stone. This species differs remarkably from all the preceding by the head being not rounded but quadrate. The base is broadly truncate, the sides behind the eyes are nearly parallel, and the hind angles are rounded. The last joint of the maxillary palpi is smaller than in the genuine Falagriæ, and the tarsi are much less elongated; the first joint of the hind tarsi is as long as the three following united, which are nearly equal, and the whole tarsus is about two-thirds the length of the tibia. The antennæ are not longer than the head and thorax, are less slender than usual, and but slightly thickened externally. The abdomen is broader and flatter than usual, and scarcely narrowed towards the base; the dorsal segments are very finely punctulate, and the first three are impressed as usual, but the impressions are not punctured.

F. partita, nigricans, subtilissime pubescens, haud punctulata, capite postice truncato, thorace ovato, latitudine haud longiore, profunde canaliculato, scutello modice canaliculato, elytris paulo convexis; pedibus testaceis, antennis fuscis apice magis incrassatis. Long. 2—2·5 mm.

Florida and Louisiana. This little species might be easily confounded with F. dissecta Er., but is somewhat larger, and has the scutellum much less deeply channelled, and not bicarinate. The antennæ in both are less slender and less elongate than in our other species.

F. vaga, elongata, subdepressa, dense punctulata, subtiliter pubescens, capite ad basin recte truncato, angulis posticis rectis rotundatis; thorace latitudine paulo longiore, postice modice angustato, medio late vage canaliculato; elytris thorace latioribus, at haud longioribus; abdomine fere lævi, versus basin pallidiore, ano testaceo; pedibus testaceis, antennis fuscis. Long. 3·5 mm.

One specimen, Lake Superior. I refer this species to the present genus with some hesitation, but the head is so much more strongly constricted behind, that I am unwilling to refer it to Tachyusa. The head is truncate behind, with the hind angles less rounded, and the neck less slender; the sides behind the eyes are parallel. The thorax is as wide as the head, longer than wide, obliquely truncate each side at the apex, with the sides straight, converging slightly behind, base broadly rounded; disc flattened, feebly but broadly channeled. Elytra distinctly wider than the thorax, flattened, truncate at tip, with the outer angle acute; abdomen slightly narrowed at the base, impressed as usual, but with the impressions not punctured. Hind tarsi with the first joint not as long as the three following, which diminish slightly in length. The antennæ are longer than the head and thorax, slightly thickened externally, but the outer joints are somewhat distant, and not closely placed, as in the genuine Falagriæ; the first three joints are elongated as usual. The last joint of the maxillary palpi is scarcely one-half as long as the preceding, and is very slender and acicular.

F. cavipennis, fere linearis, nigra, nitida, tenuiter pubescens, capite lævi, thorace ovali, vel nigro vel piceo, latitudine longiore, parce punctulato, medio vage longitudinaliter impresso, elytris testaceis, thorace paulo latioribus at haud longioribus, fortiter granosis, deplanatis margine laterali elevato acuto; abdomine lævi, basi vix angustato, segmentis duobus primis, pedibus antennisque testaceis, his apicefuscis. Long. 3·5 mm.

Mas segmento abdominis dorsali penultimo dente apicali ad medium armato.

Two specimens found by me on the sea-shore, at San Pedro, California. This species agrees with the preceding in the form of the antennæ, palpi, feet and head; but the thorax is regularly oval, not narrowed behind; the abdomen is less narrowed towards the base, and broader and flatter than in them; the dorsal surface is entirely without punctures, even in the transverse impressions of the first three segments. The antennæ and tarsi are very much elongated, as in F. bilobata, cingulata, &c. I observe no sexual differences, except the one mentioned above.

The following table will distinguish the species of Falagria now before me:

I. Elytra smooth or punctulate.

A. Head rounded behind the eyes; thorax deeply sulcate:

Thorax finely and densely punctulate.

Scutellum distinctly channeled ..... 1. scutellaris.

Scutellum scarcely channeled ..... 2. bilobata.

Thorax sparsely punctulate ..... 3. cingulata.

Thorax nearly smooth ..... 4. læviuscula.

B. Head subquadrate behind the eyes.

a. Thorax deeply sulcate:

Elytra densely punctulate:

Scutellum not channeled ..... 5. quadriceps.

Scutellum bicarinate, deeply channeled. ..... 6. dissecta.

Elytra scarcely punctulate, scutellum channeled ..... 7. partita.

b. Thorax feebly channeled ..... 8. vaga.

c. Thorax not channeled ..... 9. venustuta.

II. Elytra granose ..... 10. cavipennis.

OLIGOTA Mannh.

O. pedalis, latiuscula, nigra, haud dense punctulata, subtiliter cinereo-pubescens, thorace latitudine duplo breviore, a basi antrorsum angustato; elytris thorace longioribus, anoque piceis; antennarum basi pedibusque testaceis, illis articulis quatuor ultimis sensim majoribus. Long. ·75 mm.

District of Columbia; one specimen given me by Mr. Ulke. The antennæ are as long as the head and thorax; the first and second joints are long and thick; the third is hardly one-third the thickness of the second, nearly cylindrical, and not more than one-half longer than its width; the joints 4—7 gradually thicker, the sixth and seventh rounded, eighth and ninth wider, transverse, tenth not wider than the ninth, but longer and obtusely rounded at tip. The upper surface is sparsely punctulate, but more distinctly so on the elytra, which, as well as the tip of the abdomen, are piceous. The form resembles that of a small Gyrophæna.

MYRMEDONIA Er.

M. rudis, ferruginea, rude punctata parce subtiliter pubescens, capite nigro medio lævi, thorace canaliculato, transverso, angulis valde rotundatis: elytris nigricantibus, sutura late ferruginea, antennis fuscis basi ferrugineis. Long. 5—5·5 mm.

Mas thorace granoso-punctato, disco late depresso; abdominis segmento ultimo dorsali subdentato, apice emarginato, segmentis reliquis apice et medio lævibus.

Femina thorace punctato, haud impresso, abdominis segmentis dorsalibus fere æqualiter haud dense punctatis, ultimo apice rotundato.

A very beautiful species found by Mr. Ulke at Washington, D. C., resting on fences, before sunset. The sexual difference in the sculpture of the thorax is

remarkable; in the female the punctures are large and deep, and about as closely placed as on the elytra; in the male the punctures are replaced by elevated smooth granules, and the disc is very broadly depressed, or slightly concave. The antennæ in both sexes are longer than the head and thorax, moderately thickened externally, brown, with the basal joints reddish. The head is black shining, coarsely punctured each side, and smooth in the middle; it is but slightly narrowed behind. The thorax is transverse, about one-half wider than the head, rather flat, with all the angles rounded; the dorsal channel is well marked. The elytra are coarsely and deeply punctured. The abdomen is moderately strongly but sparsely punctured; the punctures are evenly distributed in the female, leaving only a narrow apical margin of the segments smooth; but in the male they are accumulated at the base and sides of the segments, leaving a wide apical margin and medial space smooth.

In one specimen the elytra are blackish only at the sides and tip, the rest of their surface being ferruginous.

EURYUSA Er.

Eu. obtusa, linearis, depressa, punctulata subtiliter pubescens, picea, pedibus, thorace elytrisque fusco-ferrugineis, his versus latera et ad scutellum infuscatis; thorace latitudine fere duplo breviore, coleopteris haud latiore, ante medium rotundatim angustato, basi late rotundata, angulis posticis obtusis, ante basin transversim leviter foveato; abdomine versus apicem pilosello, ano pallidiore, segmentis ventralibus margine postico testaceo; antennis fuscis, basi vix pallidioribus. Long. 3·5 mm.

Pennsylvania; a specimen found at Columbia was given to me by Professor S. S. Haldeman. The antennæ are longer than the head and thorax, and not much thickened externally; the joints 1—3 are nearly equal in length; 4—10 somewhat shorter and gradually thicker, the outer ones but slightly wider than their length; eleventh twice as long as the tenth, pointed at the end when viewed laterally. The thorax is much wider than the head, flattened, nearly twice as wide as its length, very feebly channelled, rounded on the sides, especially before the middle, broadly rounded at the base. Hind angles obtuse, not rounded, but not very well marked; a feeble transverse impression is seen near the middle of the base. The elytra are as long as the thorax. The dorsal ventral segments are more finely punctulate than the thorax and elytra, nearly smooth towards the extremity, and furnished with erect long hairs; ventral segments finely punctured, margined behind with testaceous. Feet and palpi uniform reddish testaceous.

Another specimen from the same locality is paler, the abdomen being of the same color as the head and thorax, with a fuscous cloud on the fourth—sixth dorsal segments; the hind angles of the thorax are less obtuse and very well marked, the base being feebly sinuate near the sides. There is no conspicuous difference otherwise, and I am disposed to regard it as the male of the type.

HOMŒUSA Kraatz.

H. expansa, lata, postice sensim attenuata, parum convexa, testacea nitida fortiter punctulata, subtiliter pubescens, thorace latitudine duplo breviore antrorsum angustato, lateribus valde rotundatis, basi bisinuata angulis posticis acutis productis; elytris thorace paulo brevioribus, angulo apicali externo acute producto; abdomine capite thoraceque vix longiore, vix punctulato, longe piloso; antennis fuscis, basi apiceque testaceis, thorace haud longioribus, extrorsum valde incrassatis. Long. 1·5 mm.

Two specimens found near Washington, D. C., in ants' nests, by Mr. Ulke, who has liberally placed one of them in my collection. The dorsal surface of the abdomen is a little darker than the thorax and elytra. This species is *Dinarda pedicularia* Dej., Cat.

GYMNUSA Grav.

G. brevicollis *Mannh.* A specimen was collected at Ottawa, C. W., and

kindly given to me by Mr. B. Billings, which does not differ from the descriptions and figure of this species. I have had no opportuniry of comparing it with European specimens.

TACHYPORUS Grav.

T. maculicollis, piceus, modice elongatus, antennis, palpis, pedibus, elytris thoraceque testaceis, hoc macula dorsali picea notato, elytris abdomineque subtiliter punctulatis et pubescentibus, hoc nigro-pilosello, segmentis dorsalibus ventralibusque postice testaceo-marginatis. Long. 3·25 mm.

Two specimens, Quebec, Canada; Mr. W. Couper. This species is less elongate than T. jocosus, the abdomen being scarcely longer than the elytra, which are about one-fourth longer than the thorax. The color, as above described, will enable this species to be readily recognized. In the male the penultimate ventral segment is acutely emarginate, and the last segment prolonged; in the female the last dorsal is acutely four-toothed.

T. maculipennis, piceus, minus elongatus, antennis, palpis, pedibus, thoraceque testaceis; elytris subtiliter punctulatis et pubescentibus, vitta submarginali, gutta dorsali pone basin, apiceque testaceis; abdomine nigro-pilosello, subtiliter punctulato, segmentis postice testaceo-marginatis. Long. 2·75 mm.

One female specimen from Louisiana was given me by my lamented friend, Dr. Schaum. This species is more robust than the preceding, and the abdomen is a little shorter than the thorax. The last dorsal segment is retracted, and acutely four-toothed.

A female from Illinois, given me by Mr. Ulke, is 4 mm. long, with the abdomen conspicuously longer than the elytra; the black markings of the latter are reduced in size, so that the ground color is pale, with a common scutellar spot, a large discoidal blotch, and a marginal elongate spot remain blackish. I believe it to belong to the same species as the type above described. The last dorsal segment is acutely four-toothed.

CONOSOMA Kraatz.

C. Knoxii, elongatum convexum, subtiliter sericeo-pubescens, capite nigro, thorace elytrisque testaceis, illo ante medium, his postice et extrorsum nigris, abdomine nigro, basi testaceo; pedibus antennisque flavo-testaceis, his articulis 4—9 piceis, externis crassitie longioribus. Long. 3·5 mm.

One specimen, Lycoming County, Pennsylvania. I have dedicated this beautiful species to my friend Joseph Knox, of Pittsburgh, whose genial manners, and well rewarded exertions in capturing specimens of trout added greatly to the enjoyment of the excursion in which I discovered this and other interesting additions to the fauna of Pennsylvania.

The species of Conosoma (*Conurus* Er.) in my collection agree very nearly in form and sculpture, and are to be distinguished by size and color rather than by structural differences. Several are still undescribed, but the present species may be easily recognized by the characters above given.

STICTOCRANIUS *Lec.* (n. g. Staphylinidæ).

S. puncticeps, elongatus piceus nitidus, capite grosse punctato, fronte transversim empresso, margine antico elevato; thorace obovali, capite paulo angustiore, latitudine longiore, convexo lævi, punctis utrinque 7 magnis canaliculaque brevi media insculpto; elytris lævibus punctis magnis 3 vel 4 versus suturam alterisque paucis dorsalibus insculptis; abdomine immarginato parce punctulato; antennis pedibusque piceo-ferrugineis. Long. 2·30 mm.

Two specimens of this remarkable insect were found by Mr. Ulke, near Washington, D. C.; one of them he has liberally placed in my collection. This new genus is related to Euæsthetus and Edaphus, having the tarsi 4-jointed, as in those genera; but it differs from both by the peculiar sculpture above men-

tioned, by the more elongate form, and by the abdomen being not margined. One species of Euæsthetus described by Erichson possesses the last mentioned character, but has the same sculpture as the other species. The antennæ in Stictocranius are not as long as the head and thorax, the second joint is thicker than the third, which is equal to the fourth: 5—8 rounded, nearly equal, ninth very slightly larger, tenth and eleventh broader, the former nearly square, the latter one-half longer, obtusely rounded at tip. The head is large, wider than its length, moderately convex, very coarsely punctured; the front is transversely impressed, and the anterior margin is elevated; the eyes are moderate in size, not very prominent, and are coarsely granulated. Thorax a little longer than wide, obovate, gradually narrowed behind; convex, smooth, with a short impressed line at the middle, four discoidal punctures, forming a quincunx, and four others on each side; there is also a transverse range of punctures near the base; the two posterior dorsal punctures are elongated, resembling the short medial line. Elytra convex, wider but not longer than the thorax, smooth, with a few subsutural punctures, three or four in a short dorsal series, and three or four others near the side. Abdomen pubescent, cylindrical, not margined, very finely punctulate, pointed at the tip, one-half longer than the elytra.

DELEASTER Er.

D. concolor, piceo-ferrugineus, pedibus testaceis; capite lævi, postice utrinque oblique impresso, vertice convexo, occipite transversim constricto; thorace capite vix majore, ovato, basi apiceque truncato, disco subtiliter canaliculato postice et utrinque ad latera late excavato; elytris thorace duplo latioribus, planis rugose punctulatis subopacis. Long. 7·5 mm.

Mr. Ulke received two specimens from San Francisco, California, one of which he has liberally given to me; it resembles the European D. dichrous in size, form and sculpture, but differs by the head and abdomen not being darker than the thorax and elytra.

ANTHOPHAGUS Grav.

A. verticalis *Say*. I found on the shores of Lake Superior two specimens of a variety of this species, in which the body is of a uniform black color, the legs alone being brownish-testaceous; a similar specimen occurred in Lycoming County, Pennsylvania, on the banks of the Loyalsoc.

LESTEVA Latr.

L. fusconigra *Mäklin*, Bull. Mosc., 1853, 193; *Phlœopterus fusc.* Motsch. Et. Ent., 1852, 78.

A specimen of this remarkable insect was collected in El Dorado County, California, and sent me by Dr. J. G. Cooper.

AMPHICHROUM Kraatz.

A. lævicolle, nitidum, thorace ovali, latitudine breviore, angulis valde rotundatis, disco convexo impunctato, lateribus depressis, elytris thorace duplo longioribus, haud dense punctatis breviter pubescentibus, abdomine lævi, breviter pubescente. Long. 3·75—5 mm.

Mas, minor, niger, thorace elytrisque piceis, limbo omni testaceo, ano, antennarum basi, palpis pedibusque flavo-testaceis.

Femina, major, rufo-testacea, capite nigro-piceo.

I found this species abundant on the flowers of *Cratægus tomentosa*, in Lycoming County, Pennsylvania. It is closely allied to the California A. floribundum *Lec.*, but differs by the thorax being more distinctly transverse, the hind angles more rounded, and the disc free from punctures. The antennæ are a little shorter and less slender.

Specimens of the male occur in which the elytra are entirely testaceous, but in general the disc is piceous, with the entire margin (including the suture) of each pale.

PROGNATHA Latr.

P. punctata, castaneo-fusca, nitida, capite thoraceque punctatis, elytris thorace longioribus, crebre striatim punctatis, abdomine parce punctulato, pedibus ferrugineis. Long. 4·3—6 mm.

Pennsylvania, Mr. Ulke; Canada, Mr. Saunders. This species differs from P. americana by its dark color and much stronger punctures. In well developed males the mandibles ascend in the form of a slender curved horn, and the supra-antennal horns are long and straight, converging but slightly. The elytra are free from the numerous short longitudinal lines seen in P. convergens, and are tolerably strongly striate and punctured.

LISPINUS Er.

L. lævicauda, minus elongatus convexus, piceo-niger nitidus, capite parce punctulato, thorace elytrisque subtiliter parce punctatis, illo versus angulos posticos fovea parva impresso, abdomine vix punctulato, segmentis piceo-marginatis, ano dilutiore; subtus piceus, antennis palpis pedibusque piceo-ferrugineis. Long. 3·4 mm.

Illinois, Mr. Ulke. This species is less slender than the others in my collection, and is easily distinguished by the characters above given. The exposed portion of the abdomen is not much longer than the elytra; the latter are convex, finely but not densely punctured, with the sutural stria deeply impressed.

MURMIDIUS Leach.

M. depressus, rotundato-ovalis, parum convexus, testaceus subnitidus, subtiliter pubescens, thorace latitudine fere triplo breviore, lateribus rotundatis, antice fortiter angustato, disco æqualiter parum convexo, elytris seriatim punctatis. Long. 1 mm.

This species has an extensive range in the Northern States. I have seen specimens from Pennsylvania, District of Columbia, and Ohio. Of its habits I know nothing.

Another species, of which I have received two specimens, collected by Dr. Brendel, in Florida, agrees perfectly with the figure of M. ovalis in DuVal's work, and with the description of *Ceutocerus advena* Germ. Ins. nov. p. 85. It is quite distinct from M. depressus by the larger size (1·5 mm.), oval convex form, shining lustre, less obvious pubescence, and by the sides of the thorax being distinctly impressed, especially towards the anterior margin, where just inwards from the antennal cavity may be seen a broad fovea. Germar expresses a suspicion that his species is different from Hister ovalis *Beck.*, but there is nothing in any of the works before me to warrant the belief that two distinct species have been recognized by any European entomologist.

AMPHOTIS Er.

A. Ulkei, elliptica, depressa, brumneo-picea, fere opaca, pube brevi depressa parce vestita, thorace confertim punctato, lateribus piceo-rufis subdiaphanis, late depressis, angulis posticis subobtusis, haud rotundatis; elytris margine late explanato, guttis nonnullis pone basin alterisque fasciam dentatam pone medium formantibus piceo-rufis; sutura, costisque utrinque 5 paulo elevatis breviter setosis, interstitiis sub-3-seriatim punctatis, lateribus fortiter, margine depresso disperse punctatis; subtus punctata, picea, pedibus piceo-rufis. Long. 7·5 mm.

Washington, D. C., two specimens found by Mr. Ulke; Massachusetts, Mr. Sanborn. Differs from the species of Lobiopa (to which this genus is nearly allied) not only by the less setose upper surface, but by the costate elytra; there is a series of large punctures between the convex surface of the elytra and the depressed less coarsely punctured lateral margin The mentum, though bisinuate in front, has the exterior angles more prolonged than in the other species of the genus, so that it appears broadly emarginate.

Differs from the European A. marginata by its larger size and narrower form.

On examining a specimen of Lobiopa guttulata *Lec.*, given me by Mr. B. Billings, of Ottawa, C. W., I find that the antennal grooves are slightly convergent, and do not follow the contour of the eyes as in Lobiopa undulata and setulosa: it therefore appears to belong properly to Soronia Er. The tarsi in both genera are narrow.

CYLLODES Er.

C. biplagiatus, rotundatus convexus, niger nitidus, subtiliter punctatus, elytris plaga magna subbasali rotundata rufa ornatis, punctis paulo majoribus striatim positis; pygidio nudo; antennis rufo-testaceis, clava fusca. Long. 5 mm.

Two specimens were found on Mount Holyoke, Massachusetts, by Mr. Geo. D. Smith, who has liberally placed one of them in my collection. This species differs from the European C. ater by the large red spot on each elytron near the base.

The genus Cyllodes is to be distinguished from the genera of Cychramini, defined on p. 84 of my Classification Col. N. Am., by all the tarsi being dilated, and the prosternum produced behind the front coxæ, covering the mesosternum in repose, and meeting the metasternum, which is somewhat prominent between the middle coxæ. The antennal grooves are short, not very well marked, and converge on the under surface of the head.

PITYOPHAGUS Shuckard.

P. cephalotes, cylindricus, supra piceo-niger nitidus, fortiter punctatus, capite convexo, lateribus pone oculos parvos rectis parallelis, thorace capite haud latiore, latitudine paulo longiore, lateribus rectis, angulis haud rotundatis, apice basique late rotundato, elytris stria suturali impressa, humeris rectis prominulis, lateribus parallelis, apice recte truncatis, pygidio dense punctato, concavo; corpore subtus, antennis pedibusque piceo-ferrugineis. Long. 5·5 mm.

One specimen, Columbia, Pennsylvania. This species resembles in form the European P. ferrugineus, but differs in color. The sixth ventral segment is quite distinct in the specimen, which is therefore a male.

RHIZOPHAGUS Herbst.

R. cylindricus, elongatus cylindricus, transversim valde convexus, piceo-ferrugineus nitidus, elytris postice sensim infuscatis, capite thoraceque fortiter haud dense punctatis, hoc paulo angustiore, latitudine fere sesqui longiore lateribus rectis, angulis posticis rotundatis; elytris striatim punctatis, interstitiis lævibus, stria suturali postice impressa. Long. 5 mm.

Mas capite majore, thorace ab apice postice sensim angustato; abdominis segmento 6to ventrali conspicuo.

Femina capite haud latiore, thorace lateribus antice posticeque paulo rotundatis.

Tennessee, Mr. Ulke. Larger and more cylindrical than our other species.

R. dimidiatus *Mann.*, Bull. Mosc., 1843, 300. I found a specimen on Point Kewenaw, Lake Superior, which does not differ from two Russian American specimens in my collection.

R. bipunctatus. *Colydium bipunctatum* Say, Journ. Acad. Nat. Sci., iii. 325.

Middle and Western States, and Canada. This species in the Melsheimer Catalogue is properly referred to Rhizophagus, but by a strange mistake I have in my edition of Say's Entomological Writings (ii. 183) referred it to Ips, and again in the List of Coleoptera of North America (p. 30), to Pityophagus. This last error is corrected in the errata at the end of the work.

R. approximatus, linearis, minus convexus, piceus nitidus, capite rufescente sat dense, thorace fortiter minus dense punctatis, hoc latitudine haud longiore, lateribus late rotundatis, angulis omnibus rotundatis, margine apicali basalique rufescente; elytris lateribus parallelis, apice late rotundatis, striis e punctis majoribus approximatis compositis, hic inde subimpressis, suturali postice impressa, interstitiis subrugosis; subtus rufo-piceus, antennis pedibusque piceo-ferrugineis. Long. 3 mm.

One specimen from New York given me by Mr. Ulke. Larger than the next, with the thorax broader, and the punctures of the striæ of the elytra much more closely placed. This species agrees with the description of the Russian American R. scalpturatus *Mann.*, Bull. Mosc., 1852, 362, but on account of the difference in locality it is unsafe at present to regard them as identical.

R. remotus, linearis, modice convexus, nigro-piceus nitidus, capite sat dense, thorace fortiter minus dense punctato, hoc latitudine vix longiore, lateribus late rotundatis, angulis omnibus rotundatis; elytris lateribus subparallelis, apice late rotundatis, striis haud impressis, e punctis majoribus remotis compositis, suturali postice profunda, interstitiis lævibus; subtus rufo-piceus, antennis pedibusque piceo-ferrugineis. Long. 2·5 mm.

Several specimens of this species were collected by Mr. Ulke in the mountainous portion of central Pennsylvania.

LASCONOTUS Er.

L. laqueatus, linearis, depressus, nigro piceus, opacus, subtilissime punctulatus, capite utrinque oblique impresso, impressionibus postice conniventibus, medio subcarinato, thorace latitudine paulo longiore, lateribus parallelis postice rotundatis, disco excavato, costa utrinque elevata nec apicem nec basin attingente, antice hamo elevato inclusa; elytris sutura, costis utrinque tribus, quartaque interna basali brevi anguste elevatis, interstitiis subtiliter biseriatim punctatis. Long. 3 mm.

One specimen; Arizona, Dr. Coues. Intermediate in size between L. complex and L. pusillus, and quite different from both by the characters above detailed. The discoidal costæ of the thorax are separated by a wide excavation, as usual, and do not attain either the base or the apex; in front they are surrounded by a deep impression, limited by a hook-shaped elevated line, the outer leg of which is a little longer.

L. simplex, valde elongatus, cylindricus, piceus, opacus, pilis parcis obsitus, capite antice late biimpresso, medio vix elevato, thorace punctato, latitudine fere sesqui longiore, lateribus parallelis tenuiter marginatis, angulis omnibus rotundatis, disco late sulcato, lineis elevatis solitis fere obsoletis; elytris sutura costisque utrinque quatuor elevatis, interstitiis biseriatim cribratis. Long. 2·5 mm.

One specimen from Cape San Lucas, Lower California; Mr. Xàntus. Easily known by the cylindrical form, and the almost obsolete sculpture of the thorax; the usual discoidal costæ and the hook-formed elevations surrounding their anterior extremity can be barely traced. The four costæ of the elytra are acutely and equally elevated, and the intervals each marked with two rows of quadrate punctures.

AULONIUM Er.

Au. longum, elongatum, ferrugineum, nitidum, vertice subtiliter bituberculata, thorace punctulato latitudine longiore, punctulato, utrinque profunde bistriato, a basi ad medium irregulariter biseriatim punctato, antice late excavato, vage bituberculato, et utrinque costato; elytris pone medium piceis, punctulatis, striis subtiliter punctatis, haud impressis. Long. 4·75—5·5 mm.

Arizona, Dr. Coues. This species is as elongate as Au. tuberculatum,

but has only two thoracic tubercles, which are less elevated than in Au. parallelopipedum, though more distinct than in Au. æquicolle. The striæ of the elytra are composed of finer punctures than in these species, though a little more distinct than in Au. tuberculatum.

SYNCHITA Hellwig.

S. laticollis. *Ditoma laticollis* Lec. New spec., p. 66.

The specimen which served as the type of the description had lost the antennæ, but so resembled in form, sculpture and coloration, our common D. quadriguttatum, that I had no hesitation in referring it to the same genus. I have since obtained a more perfect specimen, and find that the club of the antennæ is solid; as the antennæ are not received in grooves, I have placed the species in Synchita. An approach to the Ditoma-like sculpture is seen in S. variegata *Lec.*, but less decided than in the species in question.

NAUSIBIUS Redt.

N. repandus, linearis, depressus, fusco-piceus, subtiliter pubescens, capite thoraceque confertim punctatis, illo lateribus haud reflexis, hoc latitudine longiore, lateribus repandis, disco ante basin vix impresso; elytris confertim minus subtiliter seriatim punctatis, interstitiis angustis, vix elevatis; subtus fortiter punctatus. Long. 3·5 mm.

Mr. Ulke has found at Washington, D. C., several specimens of Nausibius differing from N. dentatus by the smaller size, narrower form, and much stronger sculpture; the upper surface of the head is uniformly and slightly convex, not depressed and reflexed at the sides as in the last named species; the sides of the thorax are not toothed in outline; the anterior angles prominent, rounded, the hind angles acute, with four very feeble undulations between them. The tooth of the hind thighs is as prominent as in N. dentatus.

LATHROPUS Er.

A species of this genus has been found abundantly by Mr. Ulke, near Washington, D. C., which by description I cannot distinguish from the European L. sepicola, except that the alternate intervals of the elytra are scarcely more elevated.

I found several specimens at Fort Yuma, California, differing from those given me by Mr. Ulke in being brown instead of black, the sides of the thorax somewhat more rounded, and more distinctly repand, and the alternate intervals of the elytra distinctly more elevated.

I am not prepared at present to discuss the value of these differences, and therefore confine myself to making known the existence of the genus in North America.

Trogosita pusillima *Mann.*, Bull. Mosc., 1843, p. 303, from Sitka, is probably a species of Lathropus, but must differ, according to description, by the thorax having a dorsal impressed line in addition to the lateral ones.

LÆMOPHLŒUS Lap.

L. angustulus, linearis, subdepressus, testaceus, subtiliter pubescens, capite thoraceque confertim punctatis, hoc latitudine fere sesqui longiore, postice paulo angustato, utrinque unistriato; elytris striatis, interstitiis uniseriatim punctatis; antennis capite thoraceque haud longioribus, articulis tribis ultimis majoribus. Long. 2 mm.

Washington, D. C.; Mr. Ulke. Narrower than our other species, approaching in form a Silvanus. The thorax is nearly one-half longer than wide, tolerably densely and strongly punctured; it is slightly narrowed behind the middle, and the angles are rectangular; the lateral stria is well marked, and the disc is marked with a vague longitudinal impression.

This species belongs to the division with the scutellum transverse, and the front very slightly emarginate, and represents in North America *L. clematidis* of Europe.

ELMIS Latr.

E. latiusculus, oblongo-ovalis, paulo convexus, niger supra nitidus, subtilissime reticulatus, thorace latitudine summa breviore, a basi antrorsum fortiter angustato, lateribus modice rotundatis, disco parce punctulato, lineis a margine remotis antice convergentibus; elytris punctato-striatis, interstitiis parce uniseriatim punctulatis, lateribus carinatis; antennis pedibusque rufis. Long. 1·5 mm.

In the mountain region of Pennsylvania; Mr. Ulke. This and the next species belong to the second group of Erichson (Ins. Deutschl., iii. 527), not before known to be represented in our fauna. The characters above given easily distinguish it from the European species described in his work. The punctures of the striæ of the elytra are but little larger, though less distant than those of the intervals.

E. nitidulus, oblongo-ovalis, angustior, convexus, niger supra nitidus, subtilissime reticulatus, parce subtiliter pubescens, thorace latitudine summa haud breviore, a basi antrorsum, angustato, lateribus paulo rotundatis, disco parce obsolete punctulato, lineis convergentibus; elytris punctis magnis remotis seriatim positis, stria 4ta profunda, interstitiis uniseriatim punctulatis, lateribus subcarinatis; antennis pedibusque rufis. Long. 1·25 mm.

New York; Mr. Ulke. Smaller and narrower than the preceding, and easily recognized by the different sculpture of the elytra. The punctures representing striæ are large and distant; the fourth stria is deeply impressed, so that the fourth interval is slightly elevated. The scutellum is almost orbicular in this species; in E. latiusculus it is somewhat oblong, or oval, while in our vittate species (E. vittatus, bivittatus and 4-notatus) it is elongate and triangular. I also observe that the base of the prothorax is feebly emarginate in front of the scutellum in E. latiusculus, though much less so than in Limnius ovalis and fastiditus. In L. elegans, the scutellum is oval rather than orbicular, and in the List I have placed that species in Elmis; but it would be preferable to adopt the opinion of Lacordaire, (Gen. Col. ii. 509), and regard the differences as not sufficient to separate the genera.

DORCUS McLeay.

D. costatus. In my List of Coleoptera of North America a new species is mentioned under this name, but, by inadvertence, does not appear in the Descriptions which accompany that work. On examining the single female upon which I proposed to found the species, I am rather disposed to regard it as an extreme variation of D. parallelus. It agrees, in form, size and sculpture, with that species, except as regards the elytra, which are not deeply striate with convex intervals, but have the suture and four narrow costæ on each, elevated, shining and punctured; the broad spaces between these costæ, and the whole of the apex, are deeply and densely punctured. On close examination I perceive here and there faint remnants of striæ in the broad punctured spaces, and the difference in sculpture, so striking at the first view, may be regarded as produced by the suppression of some of the convex intervals between the striæ of D. parallelus, the suture, the third, sixth, ninth and outermost ones only being left. The specimen was found in western New York.

CANTHON Hoffm.

C. indigaceus, ovalis, convexus, nigrocyaneus nitidus, clypeo nigricante antice bidentato, margine anguste reflexo, confertim rugoso, elytris vix obsolete striatis. Long. 10 mm.

Fort Whipple, Arizona, Dr. E. Coues, U. S. A. This species resembles, in size and color, C. cyanellus *Lec.*, but is more oval in form, and differs by the surface being free from punctures, and by the form of the clypeus, which in C. cyanellus is four-toothed, with the margin scarcely reflexed, while in the present species it is formed as in C. lævis. The eyes are narrow; the margin of the thorax is scarcely interrupted on the under surface near the anterior angles, the tubercle seen in most species being nearly effaced, though not absolutely wanting, as in C. cyanellus, simplex and some others.

C. puncticollis, rotundato-ovatus, antice convexus, ater opacus, subtiliter reticulatus, clypeo obtuse 6-dentato, margine reflexo, capite parce punctato, antice rugoso, thorace parce et profunde, licet haud fortiter punctato, lateribus medio angulatis; elytris depressis, striis distinctis, interstitiis granulis vix elevatis parcis obsitis. Long. 6—7 mm.

Two specimens, Cape San Lucas, Lower California, Mr. Xàntus. This species has the appearance of small specimens of C. praticola *Lec.*, and, like it, has the eyes narrow, and the margin of the prothorax interrupted on the under surface by a well-marked tubercle, but differs from it as from all the other species in my collection, having the last mentioned character, by the distinct punctulation of the head and thorax. The color is a dull black, as in C. praticola; each elytron is slightly bituberculate at the base near the scutellum in both specimens, but more distinctly so in the larger.

COPRIS Geoffroy.

C. remotus, cylindrico-ovalis, niger nitidus, capite punctato, clypeo semicirculari, antice remote obtuse bidenticulato, thorace canaliculato irregulariter punctato; elytris interstitiis convexis lævibus, striis subtilibus punctatis. Long. 14 mm.

Mas capite cornu cylindrico erecto frontali, thorace tuberculis quatuor magnis externis compressis, intermediis conicis; fovea magna utrinque versus latera, plicaque brevi armato. Femina latet.

Texas, near the Rio Grande, two specimens. This species resembles, in the armature of the head and thorax, C. moechus and C. anaglypticus, but differs essentially from them by the clypeus being not incised at the tip, but armed with two distant small obtuse teeth; the punctures of the thorax are larger and unequally distributed, the greater portion of the surface being smooth; the medial tubercles are distant, and not united; the intervals between the striæ are smooth and convex, the striæ themselves very fine, and marked each with a row of punctures extending transversely.

GEOTRUPES Latr.

I have mentioned in the List, under the MS. name G. retusus *McLeay*, a remarkable species found, in the Southern States, under decomposing fungi. It is not described in the monograph of Geotrupes by Mr. Jekel,* and, in fact, constitutes a group distinct from any of those characterized by him.

The elytra are broadly ovate, very convex, connate and destitute of striæ; the clypeus is semicircular, with the lobes before the eyes large and rounded; the front in the ♂ is armed with a short horn or acute tubercle, which in the ♀ is reduced to a feeble elevation; the prothorax of the ♂ is flattened and declivous before the middle, and longitudinally broadly excavated, thus producing a transverse somewhat lunate elevation about the middle; in the female a slight dorsal channel is seen, and a feebly-impressed fovea each side, half way between the middle and the lateral fovea. The apical tooth of the anterior tibiæ of the ♂ is broadly emarginate at tip, and prolonged inwards into a slender acute process. The middle tarsi of ♂ are slightly larger than

*Annales de la Soc. Entomologique de France, 1855, p. 513.

those of ♀, but not thickened as in G. splendidus and its allies; the upper surface is opaque and very densely granulated; the second joint of the antennal club is normal, that is, not received in the first. If a name for this group is considered desirable, it may be called Mycotrupes.

G. retusus, nigro-æneus opacus, confertissime granulatus, fronte cornu brevi vel tuberculo armato, thorace antice fortius angustato, lateribus antice obliquis, postice incurvatis, margine laterali reflexo, basi utrinque sinuata, angulis posticis retrorsum paulo productis, disco convexo, prope basin fere retuso; elytris fortiter marginatis, haud striatis, thorace vix longioribus. Long. 14·5—17 mm.

From North Carolina to Louisiana; rare. The sides of the thorax are curved inwards for the hinder third of their length; they converge obliquely forwards from the broadest part, which is behind the middle.

CYCLOCEPHALA Latr.

C. manca, supra fusca, nitida glabra, thoracis lateribus, scutello strigisque elytrorum utrinque duabus abbreviatis pallidis; clypeo parabolico, anguste marginato, antennis 9-articulatis. Long. 19·5 mm.; lat. 9·5 mm.

Mas tarsis anticis incrassatis, ungue interno majore, crassiore, apice fisso, antennarum clava haud elongata.

One male, Arizona, Dr. Coues, U. S. A. This species has an elongate form, being somewhat similar in size and form to Chalepus trachypygus. The color above is dark brown, the sides of the thorax and two short vittæ on each elytron are pale yellow; the scutellum is pale yellow, margined behind with brown; the head is moderately punctured, the clypeus parabolic and very narrowly margined; the palpi and antennæ are brown, the latter have but nine joints, the sixth being thicker but not longer than the third; the club is a little longer than the joints 2—7 together, but does not present the elongate form seen in the males of our other species; the thorax is twice as wide as long, gradually narrowed in front, rounded on the sides, finely and sparsely punctured, sides pale, with a large brown cloud connected with the ground color of the disc; elytra sparsely punctured, punctures finer towards the tip; a faint trace of a discoidal elevated stripe may be seen, outside of which are two parallel pale yellow vittæ occupying the middle third of the length; pygidium and pectus testaceous, hairy; abdomen brown; the last segment and hind margin of penultimate yellow; feet testaceous; trochanters, knees, margin of tibiæ and tarsi brown.

LIGYRUS Burm.

L. rugiceps *Lec.* Proc. Acad. Nat. Sc. Phila., 1856, p. 21. For excellent specimens of this species, found in Louisiana, I am indebted to Mr. Ulke. The thorax is comparatively larger than in L. relictus, with the sides more rounded in front, and nearly parallel behind; the punctures of the thorax and of the elytral rows are larger, shallower and more umbilicated than in L. relictus, and those of the intervals smaller; the color is duller black. The difference in size is considerable, the present species being but 13·5 mm. long., while L. relictus is from 18—22 mm. I observe no sexual differences in the specimens before me. This species has been accidentally omitted in the List.

STRATEGUS Hope.

S. cessus, elongato-ovalis, supra nigro-piceus, nitidus, capite confertim punctato, fronte transversim carinata, clypeo triangulari apice rotundato, thorace ovate ad medium circulariter excavato, pone apicem transversim breviter cornuto (♂) vel tuberculato ♀; corpore ferrugineo, tibiarum margine tarsisque obscuris, mandibulis haud dentatis. Long. 31 mm.; lat. 17 mm.

Arizona, Dr. Coues. Two other specimens are in Mr. Ulke's collection.

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This species resembles in form S. splendens, and, like it, presents no great sexual differences. It differs from that, as from all other species of the genus known to me, by the mandibles being broadly truncate at tip, with the outer angle rounded. I may remark, in passing, that the ♂ of S. splendens resembles very much the ♀ of S. Julianus, but may be easily distinguished by the form of the clypeus, which in the latter is more acute and subtruncate at tip, while in the former it is less acute, and more rounded. The excavation of the prothorax likewise retains in the ♀ of S. Julianus a subtriangular form, while in S. splendens it is quite circular.

PHILEURUS Latr.

P. illatus *Lec.* On renewed examination of the fragments upon which I established this species, with specimens of P. vitulus *Lec.*, N. Sp. p. 80. from Cape San Lucas, I am convinced that they are identical; the latter name should therefore be suppressed. The species is common to the region of the Colorado Desert, and Lower California, and is another example of the propriety of including the latter province within the zoological, as it will eventually be within the political, boundaries of the United States.

ANCYLOCHIRA Esch.

In my revision of the Buprestidæ of the United States, I have divided the species of this genus into two groups. The first contains those in which the anterior tibiæ are emarginate internally in the male, and hooked at the extremity; the last three dorsal segments of both sexes are rounded; the fifth ventral segment varies in form, according to sex; the thorax is sometimes subcarinate, but never channeled. The second contains the species having the tibiæ alike in both sexes; the antepenultimate dorsal segment is truncate or emarginate; and the fifth ventral is alike in both sexes, broadly truncate, with the angles slightly prolonged; the thorax is always feebly channelled. A. sexplagiata, Langii and fasciata, which, in the List, are placed in the first division, should be transferred to the second.

ACMÆODERA Esch.

A. amplicollis, robusta cuneiformis, ænea, vel cyaneo-ænea, punctata, supra pube longa erecta villosa, subtus laxe cinereo-pubescens, thorace longitudine triplo latiore, lateribus valde obliquis parum rotundatis, fortiter marginatis, ad basin elytris latiore, fortiter punctato, medio canaliculato et triangulariter excavato, ad basin utrinque excavato, vitta lata submarginali a basi fere ad apicem extensa, flava: elytris nigris, vitta dorsali abbreviata, cum altera marginali postice connexa, fasciisque posticis plus minusve connexis flavis; striis grosse punctatis, interstitiis angustis convexis uniseriatim punctulatis. Long. 10—12 mm.

Fort Whipple, Arizona, Dr. Coues. At first sight this species resembles the Texan A. semivittata *Lec.*, but it differs very much in the form of the thorax, by the elytra being narrowed behind from the base, and by the striæ being formed of very coarse punctures. It resembles, in the form of the thorax, A. flavomarginata and opacula, but is more robust than those species; as in them the last ventral segment has an acute submarginal crest around the tip.

A. decipiens, subcuneiformis, nigro-ænea, punctata, pilis longis nigris erectis villosa, subtus laxe cinereo-pubescens, thorace longitudine triplo latiore, prope basin elytris latiore, lateribus rotundatis acute marginatis, vitta submarginali antice abbreviata flava ornato, grosse punctato, medio canaliculato, et triangulariter vage excavato, utrinque oblique excavato; elytris a basi subangustatis, versus apicem sensim rotundatim attenuatis, nigro-æneis fasciis transversis varie connexis variegatis, striis antice punctatis haud impressis,

pone medium exaratis, interstitiis uniseriatim subtilius punctatis. Long. 10 mm.

One specimen, Arizona, Dr. Coues. This species resembles A. variegata in the marking of the elytra, and general form of the body, but differs essentially in the form and excavations of the thorax: the sides are considerably rounded, less oblique than in A. connexa, less suddenly and less strongly incurved at the hind angles; the transverse submarginal crest of the last ventral segment is very short, almost as in A. ornata.

AGRILUS Sol.

A. Couesii, viridiæneus, capite nitido, fortiter punctato, fronte bituberculato, vertice transversim valde excavato, thorace obscuro, rugose punctato, costis elevatis duabus politis, sulco dorsali maximo lateribusque obliqne excavatis, his albo pubescentibus, lateribus fere rectis angulis posticis carinatis; elytris confertim punctatis, sutura costaque utrinque dorsali fere ad apicem extensa, elevatis lævibus obscuris, sulco subsuturali breviter cinereopubescente, spatiis duabus lævibus nitidis versus apicem ornato, apice parce spinosis; subtus maculis argenteo-pubescentibus variegatus. Long. 11 mm.

One specimen, Arizona. It gives me pleasure to commemorate the valued labors of Dr. Coues in Arizona by dedicating to him this beautiful species. It is of a more tropical form than any other in my collection, and is easily recognized by the characters given above; the two spots in the elytral sulcus unite the elevated suture and the discoidal costa; one is at the end of the latter, and the other a little anterior. The scutellum is of the usual form, but is deeply excavated and punctured in the middle, and not transversely carinate; the ungues are armed with a large tooth, which is not acute at tip. This species is to be placed as a distinct group, before A. bilineatus. (Vide Lec. Trans. Am. Phil. Soc. xi. 242.)

A. cuneus, linearis, postice angustior, æneus, opacus, capite convexo, confertim punctato, vix canaliculato, thorace latitudine haud breviore, lateribus fere rectis, postice paulo angustato, angulis posticis longe carinatis, disco confertim punctato et transversim rugoso, medio obtuse canaliculato, lateribus anguste depressis; elytris versus suturam longitudinaliter impressis, ab humeris sensim angustatis, apice serratis et singulatim rotundatis, confertim æqualiter granulatis; subtus æneus nitidus, subtiliter punctatus, abdomine antice late canaliculato. Long. 5 mm.

Texas; one specimen in the collection of Mr. Ulke. This species belongs to the division having the claws distant, and armed with a broad, not very prominent tooth.

XENORHIPIS Lec. (n. g. Buprestidæ.)

X. Brendeli, æneo-ater, opacus, capite thoraceque reticulatim punctatis, hoc quadrato, subtilius canaliculato, ante medium transversim impresso, elytris granulis elevatis asperatis, margine præcipue postice serrulatis, plaga basali pallida ornatis. Long. 5 mm.

One specimen, Peoria, Illinois; collected by Dr. E. Brendel and communicated to me by Mr. H Ulke.

This new genus has the general form and sculpture of Anthaxia, but differs from that as from all other Buprestidæ by the antennæ being pectinate.

Body elongate, dull black, with a brassy tinge; head and thorax sculptured with shallow reticulations (as in Anthaxia); the former convex, with a broad medial furrow; antennæ longer than head and thorax, black, 11-jointed, first joint obconical, second and following about equal in length, produced externally into a long process, which is near the base in the second joint, but gradually changes its position until it becomes apical in the tenth joint; eleventh joint similar in length and form to the ramus of the tenth joint. Thorax quadrate, wider than its length, with the angles acute; slightly convex,

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sculptured as the head, slightly channeled, and marked with a strong transverse impression just before the middle: apical and basal margins bisinuate-sides slightly rounded in front and subsinuate behind. Elytra rough with elevated points, sides serrate, more distinctly toward the tips, which are separately rounded; broadly impressed each side at the base, and ornamented with a large pale spot, which extends nearly one-third the length, and fades insensibly into the black ground color.

Body beneath black, somewhat shining, under surface of prothorax reticulate, of trunk granulate like the upper surface. Feet piceous, hind tarsi with the first joint as long as the others united, third and fourth joint with short membranous lobes; ungues simple.

The antennæ are inserted under small oblique ridges, the front is not dilated. The mentum is broad, transverse, and apparently rounded in front. The prosternum behind the coxæ is narrow, not angulated on the sides, acute at tip; the mesosternum is completely divided, and is not connate with the metasternum; the side pieces of the latter are moderately broad, the epimera not covered by the abdomen, and the sternum itself is marked each side with a large hairy depression. The hind coxæ are broad, scarcely narrowed externally, and extend not quite to the side of the abdomen. The last ventral segment is emarginate.

I consider this genus as representing a new group of the tribe Buprestini (Lec. Class. Col. 151), between Buprestes and Anthaxiæ.

DYSTAXIA Lec. (n. g. Buprestidæ).

D. Murrayi, elongato-ovalis, convexa, læte viridi-ænea, capite thoraceque confertim punctatis, hoc trapezoideo a basi antrorsum angustato, longitudine plus duplo latiore, lateribus obliquis rectis, basi bisinuato, angulis posticis acutis; elytris thorace paulo latioribus, confertissime punctatis et subtiliter cinereo pubescentibus; subtus confertim punctata, pube alba dense vestita, antennis pedibusque læte rufo-testaceis. Long. 14 mm.

One female from California, presented to me by Andrew Murray, Esq. This new genus is founded upon an insect of rather stout form, having the elytra a little wider than the thorax, parallel and finely margined on the sides, rounded and not serrate at tip; having the claws armed with a large but not very acute tooth, and the membranous appendage of the fourth tarsal joint deeply divided into two narrow lobes, as in Schizopus.

The head is short and convex, the antennæ inserted under very slight frontal ridges, and are feebly serrate in the female; the joints 1—4 are smooth and shining, the following ones slightly porous, and feebly pubescent on the sides. The eyes are transverse, elliptical, moderate in size, and finely granulated. The labrum is small and deeply emarginate; the mandibles are short and very stout; palpi broken. The thorax is trapezoidal, sides straight, with the lateral margin well marked behind the middle; base broadly bisinuate, hind angles acute; scutellum transverse, acute at tip. Elytra destitute of striæ, each broadly rounded at the base, fitting closely the basal outline of the thorax; wider than the thorax, parallel and finely margined at the sides, obtusely rounded at tip. Prosternum short, slightly produced over the mesosternum, obtusely rounded at tip; mesosternum short, side pieces large, extending to the coxæ; metasternum short, posterior outline sinuate, with an oblique engraved line near the inner half; episterna wide, epimera very small. Anterior and middle coxæ small: trochantin indistinct or wanting; hind coxæ extending nearly to the side of the abdomen, slightly wider inwards. Legs slender, femora unarmed, tibiæ with small spurs; tarsi shorter than the tibiæ, joints 1—4 with membranous lobes beneath, second lobe slightly emarginate, third lobe deeply emarginate, fourth lobe bilobed and much longer, claw joint moderately long, claws armed with a tooth near the tip. Abdomen with five ventral segments, the first and second connate, the fifth rounded at tip.

A careful comparison of this singular insect with Schizopus l æ t u s *Lec.* (figured in Thomson's Arcana Naturæ pl. xiii. f. 4), shows that, apart from the form and number of the last ventral segments, and the less strongly serrate antennæ, which are sexual characters, the two genera differ very slightly; the side margin of the thorax is indistinct, even towards the base in Schizopus, and the sides themselves are somewhat curved; the scutellum is less transverse, the punctuation of the upper surface is coarser, and the pubescence of the under surface less dense; the membranous lobes of the first, second and third tarsal joints are much less developed; and the labrum is somewhat larger, though also emarginate. On comparing D y s t a x i a with an ordinary Buprestide (one of the second division of A n c y l o c h i r a for instance), there is seen to be almost no difference in the head, except that the mandibles are thicker and more obtuse, as many other genera of Buprestidæ; the prosternum fits less accurately to the mesosternum; the trochantins of the front and middle coxæ are less distinct, and the hind coxæ are less dilated inwards. All these are characters of feeble importance, and the only really well marked distinctions, of more than generic value, consist in the divided membranous tarsal lobes, and the toothed ungues. The last character is seen in several genera of Buprestidæ, and the former is certainly insufficient for more than a secondary division of the family.

I therefore conclude that the family Schizopodidæ must be suppressed, and that Schizopus and Dystaxia must be associated as a separate tribe, which may be placed after Buprestini, under the name Schizopini, and characterized by the lobe of the fourth tarsal joint being cleft.

STETHON Lec. (n. g. Eucnemidæ).

S. p e c t o r o s u s, cylindricus, antice paulo latior, piceus haud nitidus, supra confertim punctatus, brevissime pubescens, capite magno, fronte obsolete canaliculata, thorace latitudine vix breviore utrinque obsolete bifoveato, et pone medium obsolete canaliculato; elytris striatis, antennis, palpis pedibusque obscure rufis. Long. 8 mm.

Two specimens of this species were found by Mr. M. Schuster, in central Illinois, one of which he has kindly placed in my collection.

This genus is readily distinguished by the following characters: Head large, eyes not touching the anterior margin of the prothorax; epistoma broad, emarginate each side for the reception of the antennæ, which are distant, 11-jointed; first joint long, as usual, second very short, third twice as long as wide, 4—10 quadrate, gradually shorter, more transverse, and slightly narrowed inwards, eleventh rounded at tip, one-half longer than the preceding. Maxillary palpi compressed, last joint securiform. Prothorax with a deep channel beneath the lateral margin, for the reception of the antennæ, this channel sharply terminated under the hind angles; side pieces excavated behind for the reception of the anterior legs; prosternum very broad, strongly margined in front, lateral sutures *much curved*, convex outwards, not excavated, posterior process broad, acuminate at tip. Metasternum with the side pieces very narrow; hind coxæ broad, somewhat dilated internally, and obtusely angulated. Last ventral segment obtusely acuminate at tip. Legs short, tarsi not lobed beneath, first joint as long as the four following united, claws not toothed.

It resembles O t h o (known to me only by figure and description), but differs by the third joint of the antennæ being longer than the fourth, by the antennæ being less approximate and not pectinate, and by the form of the hind coxæ. I infer also that the sutures of the prosternum are different in direction, since such an important character would not have been overlooked in the description of the European genus. It has also strong relations with D e n d r o c h a r i s, from which it differs by the non pectinate antennæ, and simple tarsi, as well as by the epistoma being distinctly emarginate for the insertion of the antennæ, and by the eyes not touching the prothorax.

FORNAX Lap.

F. basalis, niger, elongatus, subcuneiformis, dense subtiliter punctatus, nigro-pubescens; elytris vix striatis, basi late cinereo-pubescentibus, thorace latitudine paulo longiore, pone medium canaliculato, et triangulariter late excavato. Long. 8 mm.

California; Mr. Akhurst; specimens were also obtained by Dr. Horn. This species is more robust than F. cylindricollis, to which it bears resemblance on account of the sculpture and thoracic impression, but it differs by the grooves for the reception of the antennæ being feeble, and ill defined, and by the fourth tarsal joint being not at all dilated. It agrees with F. cylindricollis in having the third antennal joint twice as long as the fourth, and in the ungues being not toothed.

F. calceatus belongs to the genus Dromæolus *Kies.*, which, as appears to me, should not be separated from Fornax; to those who regard it as distinct, the name Isarthrus *Lec.* (Proc. Acad. Nat. Sci., vi. 48) will recommend itself on the ground of priority.

MICRORHAGUS Esch.

M. rufiolus, fusco-ferrugineus, helvo-pubescens, capite fortiter, thoraceque sat dense punctatis, hoc latitudine paulo breviore, lateribus rectis parallelis, angulis posticis productis carinatis, ante basin breviter subcarinato; elytris a basi sensin attenuatis, apice rotundatis, punctatis, obsolete striatis; prothoracis margine superiore brevi antice ambiente, inferiore ad apicem paulo abbreviata; antennis elongatis, vix serratis, articulis 2 et 3 æqualibus, brevibus, 4to conjunctis paulo longiore. Long. 5 mm.

Ohio; several specimens were collected by Mr. H. S. Fay, one of which was kindly given me by Mr. Ulke. The small size of the third antennal joint, which is scarcely longer than the second, readily distinguishes this species from those previously described. The upper marginal line of the thorax is very short, the lower one extends from the base almost to the tip; the hind angles are strongly carinate, and the carinæ are straight.

M. pectinatus, linearis, vix cuneiformis, piceus, helvo-pubescens, capite confertim punctato, subcanaliculato, thorace latitudine breviore, antrorsum subangustato, lateribus perparum rotundatis, linea marginali superiore integra, angulis posticis deplanatis, disco sat dense profunde punctato; elytris profunde punctatis, vix obsolete striatis; antennis rufo-piceis, pedibus pallidioribus. Long. 4 mm.

Mas antennis pube erecta villosis, articulis 3—10 apice ramo cylindrico munitis.

York Co., Pennsylvania; kindly given me by Prof. L. Agassiz. This species, by the entire upper marginal line of the thorax, and the pectinate antennæ, differs from all the other native species known to me; in these characters it resembles M. pygmæus of Europe, but on comparison the sculpture of the prothorax appears quite different; in the latter the punctures are large and shallow, while in M. pectinatus they are smaller and deep.

HYPOCŒLUS Esch.

H. terminalis, elongatus, ater opacus, confertissime punctatus, subtiliter helvo pubescens, capite dense punctato subtiliter carinato, thorace latitudine vix breviore, a basi antrorsum paulo angustato, lateribus ante medium paulo rotundatis, dorso postice subcanaliculato, angulis posticis acutis, obsolete bicarinatis; elytris confertim rugose punctatis, substriatis; antennis pedibusque rufo-piceis, illis articulo ultimo præcedentibus duobus longiore. Long. 4 mm.

Ottawa, Canada; Mr. Billings. This little species resembles in size and

form Eucnemis amœnicornis, but is readily distinguished both by the generic and specific characters.

The antennæ are about half the length of the body; the first joint is rather stout, and reaches to the hind margin of the eyes, the second is small, the third about one-third longer than the fourth; the joints 4—10 gradually increase slightly in length and thickness, and the eleventh is longer than the ninth and tenth united, parallel on the sides, and obtusely rounded at tip; the inflexed portion of the prothorax is broadly but distinctly concave, midway between the prosternal suture and the side margin, for the reception of the basal portion of the antennæ; the prosternal sutures are deep, and the posterior spine rather broad. The hind coxæ are gradually but strongly dilated inwards, and broadly truncate behind, almost exactly as in Euc. amœnicornis. First joint of middle and hind tarsi as long as the others united; fourth joint not dilated, claws small, simple.

The fine carina of the head extends from between the antennæ to the occiput, and might, without careful observation, be regarded as an impressed line.

Eucnemis frontosus *Say* seems to be better placed in this genus than in Nematodes, to which, in the List, I have referred it. The first joint of the antennæ is much stouter than in N. atropos and penetrans; the inflexed portion of the prothorax is wider, and the prosternal spine is broader and more obtuse.

Epiphanis cornutus *Esch.* Many specimens of this species were found by Mr. Ulke in the mountains of Central Penneylvania. I have also seen specimens from Canada.

NEMATODES Latr.

N. simplex, fusco ferrugineus, elongatus, minus subtiliter helvo-pubescens, capite confertim punctato, antice valde convexo, thorace latitudine fere longiore, antrorsum subangustato, lateribus rectis, confertim punctato, postice vage subcanaliculato; elytris ab humeris subangustatis, striatis, interstitiis confertim punctatis; subtus punctatus, propectore haud sulcato, tarsorum articulo 4to simplici; antennis articulis 3—10 æqualibus. Long. 7·5 mm.

One specimen from New York in the collection of Mr. Ulke. Resembles in appearance Agriotes oblongicollis. This species differs from those previously described by the entire absence of vague grooves for the reception of part of the antennæ, and by the fourth joint of the tarsi not being dilated or lobed. The first joint of the hind tarsi is as long as the three following.

CEROPHYTUM Latr.

C. convexicolle, subcylindricus, niger opacus, tenue pubescens, dense fortiter punctatus, thorace longitudine plus duplo latiore, lateribus valde rotundatis, angulis posticis haud prominulis; antennarum articulo 3io lato triangulari, 4to et 5to ad medium obtuse ramosis, tibiis tarsisque obscure ferrugineis. Long. 7 mm.

One male specimen was sent me by my friend the late Dr. Schaum, as found at Sacramento, California. It resembles closely the male of C. pulsator, but the thorax is more rounded on the sides, especially behind the middle, so that the hind angles are much less obvious; the third joint of the antennæ is also quite different in form, being triangular, with the outer angle obtusely and slightly produced; the fourth and fifth joints are produced at the middle of the outer margin into obtuse processes; the processes of the outer joints originate near the base of each joint; in C. pulsator all the processes originate at the base of their respective joints, and the third joint is not different in form from the fourth. The tibiæ and tarsi are tinged with ferruginous.

ADELOCERA Latr.

A. pyrsolepis, castanea, confertim punctata, squamis fulvis dense tecta, paucis nigris intermixtis, thorace latitudine haud longiore, antice angustato, lateribus ante medium rotundatis, angulis posticis parvis, divergentibus, haud carinatis, medio late canaliculato; elytris dorso depressis, punctis nigris marmoratis; subtus, antennis pedibusque fuscis. Long. 13 mm.

New Mexico; one specimen from New Mexico in Mr. Ulke's collection. Allied to A. rorulenta *Lec.*, but differs by the more robust form, brown color, more dense golden fulvous scales, and by the less elongate thorax having the hind angles divergent. It agrees nearly with the description of the European A. lepidoptera, as given by Candéze (Elat. i. 52), except that there is no impression each side of the dorsal channel of the thorax.

A. maculata, nigra, supra nigro-squamosa, confertim punctata, maculis pallide aureo-squamosis ornata, thorace latitudine longiore, convexo, antice angustato, lateribus parallelis antice rotundatis, angulis posticis rectis planis, haud divergentibus; elytris extrorsum obsolete striatis, dorso vix depressis; subtus pallide squamosa, antennis pedibusque fuscis. Long. 13 mm.

One specimen found near Philadelphia, by J. Johnson Brown, Esq., and another at Washington, D. C., by Mr. Ulke. Related to A. avita, but differs by the pale scales not being uniformly diffused, but aggregated into spots. The thorax is scarcely channeled, and is ornamented with four discoidal patches of pale golden scales; the sides, and to a less extent the apex, are sprinkled with similar scales. The elytra are slightly depressed towards the suture, and are feebly striate towards the base and sides; there are small scattered patches of pale golden scales, and two spots placed near the sides at three-fourths of the length of the elytra, forming an oblique sinuous short fascia; another spot is seen on the side near the apex. The front is not concave; the antennæ are fuscous, and extend to about the middle of the thorax. The feet are fuscous, and the tarsal grooves of the under surface of the prothorax are distinct, though not well defined. The under surface of the body is uniformly though not densely clothed with pale scales.

ALAUS Esch.

A. melanops *Lec.* New Spec. Col. N. Am. 83 (March, 1863), is A. naja *Candéze*, Mém. Acad. Roy. Belgique, xvii. p. 18 (1864).

CRYPTOHYPNUS Esch.

C. quadripustulatus *Germ.*, Zeitsch. Ent., v. 142; *Candéze*, Mon. El., iii. 76. *Elater quadr.* Fabr., Syst. El., ii. 248.

Specimens which agree with the descriptions of this European species were found by Mr. Ulke at Washington; they all belong to the variety in which only the humeral spot of the elytra is present. The resemblance in form to a small Cardiophorus, mentioned by Candéze, is very striking.

C. gentilis, niger, pube brevi subtili flavo-cinerea vestitus, thorace confertim subtiliter punctato, linea dorsali vix conspicua, latitudine vix breviore, a medio antrorsum angustato, et lateribus rotundato, angulis posticis acutis, haud divaricatis, breviter carinatis, apice testaceis; elytris striatis, interstitiis convexis, dense punctulatis, utrinque maculis duabus flavis ornatis; sutura postice, epipleuris, tibiis tarsisque testaceis; femoribus antennisque piceis, his articulo 3io 2ndo paulo longiore. Long. 3·5 mm.

Nebraska; two specimens were received by Mr. Ulke, one of which he has kindly placed in my collection. In the male the thorax is a little wider just in front of the base, so that the hind angles appear somewhat divergent, and the antennæ are slightly longer than in the female. The anterior elytral spot

extends from the humerus backwards, about one-third the length of the elytron, growing broader posteriorly, and inclining towards the suture; the posterior spot is transverse, reaching neither the suture nor the side, and is placed about the posterior third of the length.

In form this species is similar to C. c h o r i s, from which it differs altogether by its sculpture.

MEGAPENTHES Kies.

M. a n g u l a r i s, fusco rufescens nitidus, dense helvo-pubescens, thorace latitudine paulo longiore, lateribus postice parallelis, antice rotundatis, disco convexo sat dense punctato, punctis umbilicatis, postice vix canaliculato, angulis posticis fortiter bicarinatis; elytris striis punctatis, interstitiis haud convexis, rugose punctatis, antennis pedibusque paulo pallidioribus, illis articulis 2 et 3 conjunctis 4to haud brevioribus. Long. 10 mm.

One specimen; Missouri. This specimen agrees with the description of M. m o d e s t u s *Cand.*, Mon. El., ii. 507, from northern Hindoostan, except that the thorax is scarcely channeled near the base, and that the antennæ can hardly be said to be ferruginous, nor the feet red.

ANCHASTUS Lec.

A. b i c o l o r, ferrugineus, subtilius pubescens, capite thoraceque sat dense punctatis, hoc latitudine fere longiore, angulis posticis vix divergentibus, unicarinatis, lateribus rectis prope apicem rotundatis, disco convexo postice canaliculato; elytris nigerrimis, striis punctatis, interstitiis planis punctulatis; antennis obscuris, articulis 3io et 4to æqualibus. Long. 7 mm.

One specimen from Cape San Lucas, Lower California, in the collection of Mr. Ulke. The membranous lobe of the third tarsal joint extends slightly beyond the fourth joint.

MELANOTUS Esch.

M. g r a d a t u s, nigro-piceus, pube brevi subtili vestitus, thorace convexo, latitudine haud breviore, lateribus subparallelis, antice rotundatis, basi dense subtiliter, apice rude punctato, angulis posticis unicarinatis; elytris striis punctatis, interstitiis planis punctulatis, pedibus piceo-ferrugineis; antennarum articulo 3io sequente paulo breviore. Long. 13·5 mm.

One specimen from Maryland, in the collection of Mr. Ulke. Very distinct by the punctuation of the thorax, which is coarse near the anterior margin, gradually becoming fine and very dense at the base. The head is coarsely punctured, the front somewhat flattened and vaguely impressed; the thorax is feebly channeled behind the middle. The third joint of the antennæ is about twice as long as the second, and but little shorter than the fourth.

M. o p a c i c o l l i s, fuscus, capite dense punctato, thorace latitudine haud breviore, antice angustato, lateribus late rotundatis, confertissime punctulato, opace, pube erecta grisea dense vestito, versus apicem punctato, angulis posticis bicarinatis; elytris nitidis, striis punctatis, interstitiis parce punctulatis, cinereo-pubescentibus; antennis pedibusque ferrugineis, illis articulo 3io præcedente sesqui longiore. Long. 10—11 mm.

Rock Island, Illinois; Mr. B. D. Walsh. The disc of the thorax is moderately convex, very feebly channeled, covered (except near the apical margin which is moderately punctured) with a very fine punctuation, so dense as to make the surface dull; the pubescence is short and erect. The front is slightly depressed; the third joint of the antennæ is not dilated, and is one-half longer than the second. This species is very distinct by the sculpture of the thorax.

The female differs by the thorax being more convex and less narrowed in front. The antennæ are alike in both sexes.

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LIMONIUS Esch.

L. pectoralis, cylindricus, niger, vel nigro piceus, pube plumbea subtili vestitus; capite punctato fronte parum convexa, recte truncata; thorace latitudine paulo longiore, valde convexo, antice et postice paulo angustato, lateribus late rotundatis, disco subtilius minus dense punctato, ante basin breviter canaliculato, angulis posticis subtiliter carinatis testaceis, margine apicali sæpius testaceo; elytris limbo lato rufo-piceo, striis profundis punctatis, interstitiis planis confertim rugose-punctatis; subtus piceus, punctatus, prosterni lobo antico, prothoracis angulis anticis et posticis læte testaceis; pedibus obscuris, vel piceo-rufis, antennis piceis, basi dilutioribus, articulo 3io secundo paulo longiore, 4to vix breviore. Long. 7 mm.

Fort Simpson, Hudson Bay Territory. This species is quite different from any other in my collection, and seems, by description, to be related to the European L. cylindricus. As in that species, the carina of the hind angles of the thorax is very near the side margin, and the prosternum is feebly channeled between the front coxæ. The prosternal sutures are deeply excavated anteriorly, and the yellow color of the under surface of the front angles extends along the prosternal sutures half way to the front coxæ.

L. infernus. Specimens of this species, labelled Elater nimbatus *Say*, are contained in the collection of Dr. Melsheimer, now belonging to the Museum of Comparative Zoology at Cambridge, Massachusetts. The description of Say does not represent the characters of the species in a recognizable manner, but, as his specimen was obtained from the elder Melsheimer, there can be no doubt of the authenticity of the specimens now in the collection.

ATHOUS Esch.

A. limbatus, nigro-piceus, subtiliter pubescens, capite fortiter punctato, fronte valde excavata, margine reflexo testaceo, thorace latitudine longiore, antice convexo postice subcanaliculato, lateribus paulo rotundatis, angulis posticis carinatis limboque laterali angusto testaceis, confertim punctato; elytris striis punctatis, interstitiis fere planis parce punctatis, basi, limbo externo angusto, epipleurisque luteis; subtus rufo-piceus, pedibus, prosterni vitta, lobo suturisque piceo-ferrugineis; antennis obscurioribus, articulo 2ndo parvo, 3io triangulari elongato. Long. 8·5 mm.

A specimen from Northern California, given me by Mr. Ulke. The third joint of the tarsi is very slightly prolonged beneath, and the fourth joint is small. The carina of the hind angles of the thorax is very near the margin.

A. montanus, niger nitidus, subtiliter cinereo-pubescens, capite fortiter punctato, fronte excavata rubra; thorace latitudine longiore, antice convexo, dense fortiter punctato, punctis umbilicatis, basi margineque nigricante, angulis posticis rectis, carina ad marginem contigua; elytris striis profundis punctatis, interstitiis convexis parce punctulatis (basi rufis?); antennis rufo-piceis, articulo 2ndo parvo, 3io elongato triangulari. Long. 12·5 mm.

A badly preserved specimen from Montana Territory is in my collection. It resembles in appearance A. equestris, but is smaller, and the elytra are shining, and finely punctured, while in that species they are opaque, and coarsely scabro-punctate. The base of the elytra is bright rufous, but the marking is irregular, and may therefore be not constant; the tarsi are wanting, but from the other specific characters I have no doubt that they are lobed as in A. equestris.

A. undulatis *Kiesenwetter*, Ins. Deutschl. iv. 320; Candéze, El. iii. 450; *El. undulatus* De Geer; *El. trifasciatus* Herbst, &c.

Mr. Ulke has received, from Hudson Bay, specimens which agree with the description of this species, thus far found only in Northern Europe and Asia. I owe to his kindness the specimen in my collection.

CORYMBITES Latr.

C. teres, cylindricus, nigro piceus, fusco pubescens, fronte depressa, capite thoraceque dense fortiter punctatis, punctis umbilicatis, hoc latitudine longiore, convexo, lateribus rectis parallelis, angulis posticis vix obsolete carinatis, haud divergentibus; elytris striis subtiliter punctatis, interstitiis planis punctulatis; antennis pedibusque fuscis, illis articulo 3io 4to æquali, triangulari. Long. 12·5 mm.

One female from California, given me by Mr. Ulke. This species is allied to C. cylindriformis, but differs by the coarse and dense punctures of the head and thorax; the latter is not channeled. The antennæ scarcely attain the base of the elytra, which are slightly tinged with brassy lustre.

C. trapezium, niger, nitidus, vix conspicue pubescens, thorace latitudine breviore, fortiter marginato, lateribus rectis antice convergentibus, angulis posticis divaricatis, haud carinatis, disco paulo convexo, confertim punctato; elytris subtiliter punctatis, punctisque paulo majoribus striætim positis, margine latiusculo reflexo; antennis articulis 3—11 compressis, sensim paulo angustioribus, 3io 4to æquali. Long. 21·5 mm.

Texas; sent to me by Mr. A. Sallé. This remarkable species does not resemble any other seen by me, but I have found no characters to warrant me in separating it as a distinct genus. The body is elongate, not convex, shining black above, and almost glabrous. The head is punctured and the front is broadly concave, or rather excavated; the antennæ are longer than the head and thorax: the second joint small, the third equal to the fourth, triangular compressed, following joints gradually a little narrower, eleventh distinctly divided, terminal portion a little shorter. Thorax trapezoidal, sides straight, strongly margined; hind angles divergent, not carinated; disc only slightly convex, tolerably thickly punctured. Elytra as wide as the thorax at the hind angles, lateral margin strongly reflexed, disc finely punctured, with not very obvious striæ composed of somewhat larger punctures. Hind coxæ very narrow externally, gradually somewhat widely dilated inwards (about as in C. æthiops). Front tibiæ compressed, longitudinally concave on the anterior face; tarsi compressed, more densely pubescent beneath than usual, not shorter than the tibiæ. Front lobe of prosternum very short.

C. opaculus, niger, subopacus, dense helvo-pubescens, capite punctato, fronte concava, thorace latitudine haud longiore, convexo, obsolete canaliculato, dense punctato, lateribus late rotundatis, angulis posticis acutis divergentibus, carinatis; elytris striis profunde punctatis, interstitiis angustis rugose punctatis; tibiis tarsisque obscure ferrugineis, antennis articulo 2ndo parvo, 3io triangulari sequente vix angustiore. Long. 8·5 mm.

Oregon; in Mr. Ulke's collection. Somewhat allied to C. divaricatus *Lec.*, but the sides of the thorax are rounded. The antennæ are broadly serrate, and a little longer than the head and thorax in the specimen described.

C. mœrens, elongatus, niger, opacus, subtilissime cinereo-pubescens, capite confertim punctato, fronte convexa, vage triangulariter impressa, thorace latitudine fere duplo longiore, parum convexo, dense punctato, lateribus late sinuatis, angulis posticis divergentibus, apice truncatis, haud carinatis; elytris striis punctulatis, interstitiis fere planis, punctatis; antennarum articulo 2ndo parvo, 3io triangulari sequente paulo longiore. Long. 11 mm.

Oregon; in Mr. Ulke's collection. The antennæ in the specimen before me are as long as the head and thorax; the third joint is as broad as the fourth, and slightly longer.

This species is allied to C. lobatus, but is larger, of a more opaque black color, and the thorax is longer and less convex.

C. morulus *Lec.*, new sp. North Am. Coleoptera, p. 85 (March 1863).

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Specimens of this species from Montana have been subsequently described by Mr. Bland, under the name *C. brunnipes* (Proc. Ent. Soc. Phil. iii. 67).

It occurs at Pembina, and various other places in Hudson Bay Territory, and also in Montana and the interior of Oregon and Washington Territory.

ANAMESUS Lec. (n. g. Elateridæ).

A. convexicollis, ♀ alatus, piceus, pubescens, capite confertim punctato, fronte vage triangulariter impressa, oculis parvis lateralibus; thorace latitudine haud longiore, lateribus subparallelis, antice subrotundatis, angulis posticis paulo divergentibus, acutis carinatis, disco convexo, subtilius punctato; elytris abdomine duplo brevioribus apice singulatim rotundatis, striis haud punctatis, interstitiis punctulatis; antennis subserratis, capite sesqui longioribus, articulo 2ndo sequente paulo breviore. Long. 21·5 mm.

One specimen from Nevada in Mr. Ulke's collection. The abdomen has seven ventral segments, the five seen ordinarily in Elateridæ being increased by the first, (usually concealed behind the coxæ,) becoming visible, and by the addition of an apical segment as in the ♀ of Euthysanius (Proc. Acad. Nat. Sc. Phil. 1859, 74). In the latter, however, the number of visible segments is eight.

The wings are well developed, and folded under the elytra, which are only one-half the length of the abdomen.

Corresponding with the female above described is a male in Mr. Ulke's collection, from Fort Tejon, California. The sculpture is the same; the eyes are large and prominent; the antennæ are longer than the head and thorax, strongly serrate, with the external angle of the joints 2—10 acute; the third joint is similar to the fourth, though smaller. The elytra are as long as the abdomen, somewhat dehiscent behind, and acute at tip, paler in color than the head and thorax. The abdomen has six visible ventral segments, the last being provided with lateral pieces, as in the males of the allied genera. Length 13·5 mill.

I regard this as the male of the Nevada species, and, as indicating a new genus, differing from Aplastus by the (usual) 5th ventral segment being truncate at tip in both sexes, fully exposing the sixth segment; the fifth segment in Aplastus is rounded at tip, and the sixth retracted.

The two specimens of Aplastus optatus in my collection differ greatly in the form of the antennæ; the one from Mr. A. Murray has the joints 4—10 more strongly triangular, and more produced at the outer angle, than the specimen found at Bodega (Cal.) by Mr. George Davidson. I was therefore induced to regard the latter as a female, a view that is confirmed by the different structure of the last ventral segment in the two individuals; the lateral valves, quite conspicuous in the male, are absent in the supposed female.

The tribe Plastocerini thus exhibits in Western America a very beautiful series of gradations from Aplastus, in which the sexual differences are slight, through Anamesus, where the elytra are shortened, and the ventral segments increased in number, to Euthysanius, in which the ventral segments are still farther increased, the abdomen excessively elongated, the elytra very short, and the wings wanting. The female of Plastocerus is not yet discovered. A correspondence with this regular degradation is seen in the form of antennæ, serrate in Aplastus, and Anamesus; not greatly unequal in the sexes of the former, much shorter in the female of the latter; pectinate, with long branches in males of Plastocerus and Euthysanius, 11-jointed in the former, 12-jointed in the latter.

PLASTOCERUS Lec.

P. frater, piceo-castaneus, elytris dilutioribus, helvo-pubescens, capite thoraceque pilis longioribus vestitis, illo scabro, hoc latitudine paulo breviore, lateribus antice valde rotundatis, angulis posticis divergentibus, carinatis,

dense punctato, subcanaliculato; elytris striis punctatis, interstitiis punctatis et rugosis. Long. 13·5 mm.

Mas articulis antennarum 3—10 ramo elongato externo munitis, 11mo ramo præcedentis æquali; abdomine segmento ventrali 6to prominulo.

Fort Tejon, California, Mr. Ulke's collection. This species, of which I have seen but a single specimen, differs from P. Schaumii chiefly in the form of the thorax, which is comparatively broader and more rounded on the sides.

LAMPROHIZA Motsch.

L. splendidula *Motsch.* Etudes Ent., iii. 47; *Du Val*, Glan. Ent. i. 20; Gen. Col. Eur., iii. 161, pl. 39; *Kiesenw.* Ins. Deutschl., iv. 454.
Lampyrus splendidula Linn., &c., &c., (vide Kiesenw. loc. cit.)

A male of this European species was found by Mr. P. R. Uhler, near Baltimore, Md., and kindly presented to me. It does not yet deserve a place in our fauna.

PODABRUS Westwood.

P. Pattoni, niger nitidus pubescens, capite parce punctulato, thorace impunctato, quadrato, latitudine haud longiore, lateribus paulo undulatis, angulis anticis oblique truncatis, posticis acutis prominulis, læte flavo margine antico et postico nigricante, dorso postice bigibboso et medio excavato, margine laterali angusto reflexo; elytris haud dense minus subtiliter rugosis; antennarum articulo 3io præcedente paulo longiore et 4to paulo breviore, unguiculis appendiculatis. Long. 6·5 mm.

I found two specimens of this pretty elongate species in Lycoming County, Pa. It gives me much pleasure in dedicating it to the Hon. B. F. Patton, to commemorate his value as a friend, as well as his great interest in the object of the journey during which the specimens were collected.

It resembles in form P. lævicollis, but may be distinguished from the variety of that species with yellow thorax by the punctures of the head being less fine and less dense, and by the rugosities of the elytra being more obvious; the thorax is a little broader, the outline of the sides is not concave, but slightly convex, and the lateral margin is very distinctly depressed and slightly reflexed; the antennæ and feet are black, the first and second joints of the former are pale beneath; the palpi are pale, with the tip black. P. simplex *Couper*, Canadian Nat., 1865, 62, is also related, but the thorax is comparatively smaller and less polished, and the base of antennæ, the mouth and the feet are yellow.

Descriptions of some new CICINDELIDÆ from the Pacific Coast of the United States.

BY GEO. H. HORN, M. D.

The insects described in the present paper form part of a collection brought by myself from the west coast, accumulated during a four years' residence in California and the adjoining territories. Believing it important to make known the existence of these species, the descriptions are here given in advance of a more extended memoir on the Coleoptera of the Pacific slope of our country.

OMUS Esch.

lævis ater, subopacus, thorace latitudine haud breviore, trapezoides, modice convexo, ad basin modice intricato-rugoso; elytris sublævibus punctisque obsoletis irregulariter impressis. Long. ·75.

This species differs from all the others of the genus in being almost entirely smooth and subopaque. The elytra are regularly oval, as in *californicus*, exhibiting a few almost obsolete punctures irregularly placed like the foveæ in

dejeanii and the larger punctures of the other two species. The whole surface is very finely granulate, causing the subopaque appearance. For this species I am indebted to C. F. Hoffman, Topographer of the Geological Survey of California, who discovered it while exploring the high Sierras near the head waters of King's and Tulé rivers. Two specimens, both males, were found. It is to be hoped that further collections may be made in this region, as all the species collected were either new, or served to illustrate the descent of Arctic species. *Omus audouinii* has been found in the high ridges of the Coast Mountain, near Santa Cruz, and *californicus* has been sent me from the same region by Dr. J. G. Cooper. Doubtless many interesting discoveries will yet be made in the high mountain regions of California and Oregon.

CICINDELA Linn.

s e n i l i s, atra, opaca, fronte albo-pilosa, granulato-rugosa, thorace latitudine breviore, postice angustato; elytris pone humeros sensim latioribus, postice haud serrulatis, lunula humerali oblique prolongata, fascia media perpendiculariter refracta ad marginem vix latiore; subtus viridi-ænea, pleuris albo pilosis; labro albo, obsolete tridentato.

Mas palpis labialibus articulo ultimo pallido. Long. ·47.

Related more closely to *generosa*, though much smaller than any of the species of that group. The form is rather robust, the sides of the elytra well rounded, with the apex scarcely serrate. The markings are rather broad. The middle fascia enters at a right angle to the margin, bends rectangularly, the longitudinal portion being longer. Color above black, almost entirely devoid of any metallic lustre.

I obtained this species while in San Francisco, of M. Lorquin, from a large box of insects said to have been collected in California. I have, however, no doubt as to the truth of the locality, as all the other species were undoubtedly Californian; but as some doubt always obtains when specimens are not actually obtained in their native regions, I have thought it advisable to state the facts, that the locality of the species might hereafter be verified.

Two specimens are in my cabinet, both males.

v i b e x, viridis, fronte pilosa, utrinque subtiliter striata, thorace latitudine breviore, subquadrato, postice vix angustato; elytris pone humeros obtusos sensim latioribus, postice haud serrulatis, punctato-granulatis, lunula humerali oblique prolongata, interrupta, fascia media extus imperfecta obtuse refracta, lunula apicali interruptis; subtus cyaneo-ænea, pleuris albo-pilosis; labro albo tridentato.

Mas palpis maxillaribus nigris, palpis labialibus articulo penultimo pallido. Femina latet. Long. ·48.

Fort Klamath, Oregon. The relationship of this species is evidently with *oregona* and its allies, differing in its more elongate form and the absence of the serrulations usually found in the tips of the elytra in the species of this group. The lunules are both interrupted. The extension of the humeral being oblique. The transverse portion of the middle band is at a right angle to the margin, and the longitudinal portion oblique. The labrum is distinctly tridentate, the front covered with rather long erect hairs. The color is bright green.

For this species I am indebted to Dr. H. M. Cronkhite, Act. Assist. Surg. U. S. A., by whom many valuable species were collected during his residence in Oregon and California.

In the accompanying wood-cut the engraver accidentally cut away the subapical spot. It is very small, however, and situated between the apex of the apical lunule and the end of the middle fascia, being rather nearer the former.

g a b b i i, modice elongata, subcylindrica, supra olivaceo-ænea subnitida,

fronte subtiliter striata, thorace subcylindrico latitudine vix longiore, lateribus rotundatis; elytris subparallelis, valde punctatis ad apicem subtilius serrulatis, spina suturali parva haud prominula, lunula humerali obtuse flexa et hamata, fascia media antice curvata deinde subito et acute refracta, ad suturam oblique producta ad marginam cum lunula humerali et apicali conjuncta, lunula apicali antrorsum valde producta; subtus viridi-ænea valde albo-pilosa, labro brevi, medio prominulo unidentato.

Palpis maxillaribus utrius sexus fusco-æneis, labialibus articulo penultimo albido.

Femina elytris sutura valde ad apicem retracta. Long. ·40—46.

This is one of the prettiest and the most singular of any of the species yet reported from California. With evident relations with group xii. (Lec. Revis. Cicind. of U. S.), it possesses characters rendering it advisable to form a separate group for its reception, the position of which is in immediate succession to that containing salt marsh and fluviatile species. The following characters will serve to define it.

Thorax subcylindrical, sides rounded, posterior angles not produced in either sex. The form is slightly depressed. The elytra of the female are broader than in the male, with the tips narrowing obliquely. The markings are narrow, united along the margin. There is no basal spot. The apical lunule is prolonged anteriorly. The middle band curves toward the base, and is suddenly bent at an acute angle, and obliquely prolonged toward the suture and to near the apical lunule. The body beneath (except pectus and middle of abdomen) densely clothed with white hair. Labrum is unidentate. Palpi pale, with dark tips. Legs long, slender, trochanters and tip of abdomen reddish.

This species is not uncommon on the salt marsh near Wilmington (San Pedro), California. They fly rather poorly, and hide when pursued in the short grass. They occurred during August. It is to be hoped that further collections of this species may be made, as the greater number collected by myself were destroyed by an accident to which all bottles are liable.

I dedicate it with pleasure to my friend Mr. Wm. M. Gabb, of the Geological Survey of California, in recognition of his many very valuable services as a collector in regions inaccessible to myself.

Notes on the habits of species previously described.

C. v u l t u r i n a Lec. A beautiful green variety of this species has been sent me from northern Arizona. Similar specimens are in the cabinets of Dr. Le Conte and Mr. Ulke, from Fort Whipple, Arizona, where my specimen was probably collected.

C. v u l g a r i s Say, is found all over Oregon and California, whence collections have been sent me. In the Sierras on Kern river a beautiful sericeous green variety existed rather abundantly.

C. o r e g o n a Lec. Six specimens of this species from Oregon form a beautiful series, from the fully marked to that without any evidence of either bands or lunules. They are all of a dull green color. For these I am indebted to Dr. Cronkhite, U. S. A., who was stationed for some time at Fort Klamath, whence many interesting species have been sent me. Specimens of this species have been sent me from the southern Sierras. To this species must be referred the fragments partially described, but not named, by Dr. J. L. Le Conte; see Proc. Acad. Nat. Sci., 7, 16, and Revis. Cicind., Trans. Am. Phil. Soc., vol. xi. p. 41, spec. 22.

C. h i r t i c o l l i s Say, is in every collection made near the sea or along large rivers.

C. duodecim-guttata occurs everywhere in the Pacific regions, extending into the valleys east of the Sierra Nevada.

C. hyperborea Lec. has been sent me by Mr. Wm. M. Gabb, from the coast range near Santa Cruz. The markings of this species vary in their width. The two specimens in my cabinet have the markings distinct, while two in the cabinet of Dr. Le Conte have the humeral lunule and the middle fascia so expanded as to become confluent. I give a figure of the two varieties, with a view of completing the series of illustrations of our species.

C. pusilla Say was abundant in Owens Valley, in the beds of streams.

C. hæmorrhagica Lec. occurred with the last. It is remarkable that a species hitherto found only on the sea coast at San Diego, should occur so far inland.

C. imperfecta Lec. has been sent me from Fort Vancouver, Oregon.

C. guttifera Lec. occurred in tolerable abundance at Fort Grant, on the San Pedro river, Arizona.

Tetracha carolina Hope occurred rather abundantly at Fort Yuma, under chips, etc., on the borders of the Colorado. This insect has now been found at almost every point from the central Atlantic coast of the United States to Cape St. Lucas, at the southern extremity of Lower California. It is probably found along the greater extent of western Mexico. For this and many other species from this interesting region, I am indebted to Capt. John E. Hill, of California.

Descriptions of some new genera and species of Central American COLEOPTERA.

BY GEO. H. HORN, M. D.

MACROPNUS.

Gen. Ch.—Mentum quadrate, sides moderately rounded, slightly emarginate anteriorly. Labial palpi small, last joint ovoid, acuminate. Maxillæ armed internally with six sharp teeth in two rows, palpi moderate, last joint larger, ovoid, slightly curved, and grooved above. Mandibles tridentate at the extremity, with a somewhat flattened, vertical, slightly recurved tooth on the upper surface. Epistome parabolic, slightly margined, broader than the front, from which it is separated by a slightly sinuate suture. Thorax convex, sides strongly rounded, base moderately lobed, angles distinct, the anterior more prominent. Scutellum moderate, twice broader than long. Mesosternum produced, plane. Elytra very convex, suboval. Legs robust, anterior tibiæ tridentate. Tarsi shorter than the tibiæ, last joint with an angular process beneath. Claws unequal, the outer more robust and forked. Pygidium large, convex, vertical.

Males.—Posterior coxæ very large and very prominent internally. Trochanter prolonged into a spine, curved inwardly. Femora broad, oval, bidentate on their lower edges, flat internally, convex externally. Posterior tibiæ stout, arcuate, densely pubescent internally, obliquely rugose and deeply punctured externally, obliquely truncate, inner angle much produced.

crassipes, yellow, shining, head finely but sparsely punctured. Thorax densely and finely punctured, with larger punctures at irregular intervals. Elytra finely and densely punctured, obsoletely striate punctate, towards apex more coarsely punctured. Beneath brown, scarcely shining, moderately punctured and sparsely flavo-pilose. Length 1·07 inch.

Honduras, Dr. J. L. Le Conte. This beautiful insect has been for some years in the Academy's cabinet. I have till the present deferred its description, with the hope that in some of the many memoirs on the insects of Mexico and the adjacent regions, its description might be found. The characters above given render it inadmissible in any of the groups of the true Rutelides, combining the characters of two groups in a manner rendering it inadmissible in either. The horizontal labrum and posterior margin to the thorax define it as a true Rutelide.

Two groups form this tribe, Pelidnotæ and Areodæ, characterized mainly by the absence of the frontal suture. The present genus can enter neither group, as the presence of the frontal suture excludes it from the former, while the forked tarsal claws exclude it from the latter, while the form of the mandibles serves to distinguish it from either. By a modification of the characters of groups of Areodæ of Lacordaire, it might enter here to form the analogue of Macropoides, of the Pelidnotæ. I prefer, however, separating it entirely, to form an intermediate group. With this view the Rutelidæ veræ may be thus tabulated:

Epistome not distinct from front..... Pelidnotæ.
Epistome separate from front.
Mandibles tridentate; outer tarsal claws forked..... Macropni.
" simple; " " simple..... Areodæ.

In addition to the above characters, it might be mentioned that the front is twice as broad as long, the eyes large and convex, the epistome much broader than the front, forming the canthi of the eyes by the posterior angle. The head is short, being a third broader than long, and is deeply set in the thorax, causing the eyes to be partially hidden by its anterior angles. The mesosternal spine is moderate, flattened, and slightly grooved beneath. The large posterior coxæ depress the plane of the metasternum below that of the abdomen. Metasternum truncate posteriorly and vertical. Posterior coxæ separate. The abdomen forms an abrupt convexity beneath, thus causing the pygidium to assume a rather more acute form than usual. The pygidium is very convex from above downwards, and finely granulate, presenting a more rugose appearance than any other portion of the insect. The species resembles our Cotalpa lanigera in form, being, however, slightly more elongated, though less elongated than either of the Areodæ.

A single specimen, a male, from which the above description has been taken, exists in the cabinet of the Academy.

BRANCHUS Lec.

obscurus, oval, slightly convex, black and opaque, sparsely covered with short black erect hair, head very densely and coarsely punctured, front transversely and longitudinally impressed; thorax one-third broader than long, densely and coarsely punctured, narrowed anteriorly, and emarginate; sides broadly rounded, slightly emarginate in front of posterior angles, which are but slightly produced and rounded; base rounded at the middle, emarginate on each side. Thorax above with a median slightly elevated line, and two foveæ; on each side of the median line are four slightly oblique elevated ridges, arranged in anterior and posterior pairs. Elytra subcostate, with densely placed elevated granulations towards apex indistinctly foveate. Beneath smooth shining, scarcely punctured.

Long. ·55, lat. ·30. Nicaragua.

Differs from the other species by its less convex form; the sides of thorax are also slightly emarginate before the angles. The elytra have a distinct ridge continuous with the thoracic margin and extending very nearly to the apex. The species of this genus may be divided into two groups; *floridanus* Lec. has the thorax very convex, while in *woodii* Lec. and *obscurus* Horn the thorax and elytra are rather depressed.

ANECTUS n. g.

Generic characters as in Branchus Lec., with the following exceptions: Antennæ more slender and elongate, the ninth joint rather suddenly dilated. Mentum trapezoidal sides less rounded and less emarginate anteriorly. Gular peduncle smaller, with the median notch hardly evident. Anterior tibiæ slightly emarginate at apex, outer angle not prolonged externally. Intercoxal process of abdomen rectangularly truncate.

This genus, indicated but not named by Le Conte (Class. Col. N. Am.), may be readily distinguished by the preceding characters from Branchus.

vestitus, oval, very convex, black and opaque, densely clothed with short ochraceous pubescense. Head very densely and coarsely punctured, front triangularly impressed, epistome ferruginous; thorax at base one-half broader than long, densely and coarsely punctured, much narrower anteriorly and broadly emarginate; sides broadly rounded, at base broadly lobed; posterior angles slightly produced; above with a slight transverse impression terminating in two fovæ, and four oblique slightly elevated lines arranged in anterior and posterior pairs. Elytra very convex, obscurely costate and foveolate; marginal ridge not reaching the apex. Beneath finely and sparsely punctured.

Long. ·63, lat. ·35. Honduras. Cabinet of Dr. Le Conte.

This species is much more convex and more regularly oval than any of the other Branchini. The legs are also more slender, and the insect has the appearance of being able to move with considerable rapidity.

The tribe Branchini presents some difficulties regarding its proper classification. The prominent ligula points to some affinity with the Praocini, but as this organ is undoubtedly retractile, and capable of being protruded, its value as a means of classifying the tribes of the Asididæ seems hardly apparent. The removal of certain tribes and parts of tribes (Scaurini pars, Blaptini, Pimeliini, Molurini pars, Pedinini, Opatrini and Trachyscelini,) this great subfamily becomes more homogenous and capable of classification. The tribes above mentioned have the posterior margins of the third and fourth ventral segments coriaceous,—a character of great value in the subdivision of the family Tenebrionidæ.

The Branchini seem to have closer affinities with the Asidini and Nycteliini. The prominent emarginate labrum, the contour of the front, and the slightly channeled tarsi seem to point toward the Asidini, while the broad emarginate and fissured gular peduncle and the form of the maxillary palpi indicate their affinity with the Nycteliini. The form of the antennæ serves to distinguish it from both tribes, the eleventh joint being as large as the preceding, depressed, and rounded at the extremity.

The following table will serve to distinguish the tribes of the subfamily Asididæ, characterized by the presence of a trochantin to the middle coxæ, and the hind margins of the ventral segments entirely corneous:

Head rhomboidal, narrowed behind.		1.
" short, not narrowed.		2.
1. Labrum prominent. Thorax emarginate	Akisini.	
Labrum partially concealed. Thorax scarcely emarginate	Cryptoglossini.	
2. Last joint of maxillary palpi securiform	Asidini.	
" " " " not securiform		
Gula sulcate.		3.
" not sulcate.		4.
3. Antennæ slender, last three joints broader	Branchini.	
Antennæ robust, last joint generally smaller	Nycteliini.	
4. Maxillæ unarmed	Physogasterini.	
Maxillæ with a corneous hook.		
Scutellum large, covering in great part the meso-thoracic peduncle	Molurini.	

Scutellum small or absent, situated between the elytra.
Mesosternum and intercoxal process of abdomen broad .. .. Praocini.
Mesosternum and intercoxal process of abdomen narrow triangular..... Coniontini.

Certain tribes admitted into this subfamily by Lacordaire have been separated entirely. The Scaurini and Scotobiini have been separated from Cryptoglossini, and the genera allied to Eulabis removed from association with Nyctoporis, and Cerenopus from Cryptoglossa. The Sepidiini have been removed from the Molurini. The genus Ogcoosoma must probably also be removed from association with Moluris and Psammodes. The validity of the removal of certain tribes and groups from the Asididæ as received by Lacordaire, appears to be still further substantiated by an examination of the manner in which the pores of special sensibility are distributed on the terminal joints of the antennæ.*

While examing the Nycteliini in the collection of the Academy, I found under *Gyriosomus* a species named "*multilineatus* Melly," which does not belong even to the subfamily. I can find no reference to such a species, and no genus into which it may properly be received. The hind margins of the third and fourth ventral segments are coriaceous. This insect should undoubtedly form a new genus near *Gonopus* and *Anomalipus*, with which it has many points of resemblance. The following table of the three genera exhibits their relations:

Epistoma trapezoidal, broadly emarginate..... ..... Gonopus.
" rounded, triangularly "
Epipleuræ indistinct, body very convex ..... Ectatocnemis.
" broad, body flattened above and margined..... Anomalipus.

In the genus above indicated the last joint of the antennæ is very small, the anterior tibiæ much more flattened than in *Anomalipus*, and have the external apical angle prolonged into a tooth, and a median tooth to both anterior and middle tibiæ. The tooth existing on the posterior edge of the apex of the anterior tibiæ in *Anomalipus* is not present in this genus. The prosternum between the coxæ is bisulcate, as in the other genera, and declivous in front and not lobed as in *Gonopus*.

The species, for which I retain the name above given, is very robust. Head broad, moderately coarsely punctured, with a vague impression each side of the emargination. Thorax one-half broader than long, very convex, densely and coarsely punctured, narrower in front, broadly emarginate; sides strongly rounded, narrowing posteriorly, angles acute, slightly prolonged, base emarginate. Elytra broadly oval, very convex, humeri obtuse, partially covered by the posterior angles of the thorax, costate, intervals with a less distinct elevated line, on each side of which is a row of elevated points.

The female is larger and more robust than the male, and the apical tooth of the tibia broader and more obtuse.

Length ·9 inch. "Coquimbo."

RHINANDRUS Lec.

elongatus, elongate, black, subopaque, head long, very finely and sparsely punctulate, thorax opaque, not punctured, scarcely longer than broad,

* This character, in its application to this family, was first pointed out by Schiœdte (Annals and Magazine of Nat. Hist. Mch., 1865, p. 192, note). Its true value is not yet fully determined, but from the few observations made by myself it promises to be, at least, a very useful character in fixing the relationships of genera, the positions of which are still in some doubt. I have but casually mentioned this character, hoping to have leisure to develop it in its application to our North American genera at some future day.

truncate anteriorly; sides rounded, slightly margined, base truncate, angles of thorax not prominent, the posterior rectangular. Elytra elongated oval, convex, one-half broader at middle than the thorax, base scarcely emarginate, not broader than the base of thorax, humeri prominent, deeply light striate, and, with the marginal, deeply punctured; interstices elevated, scutellar stria short, distinct and punctured. Beneath smooth, very finely punctured.

Long. ·78 ♂, ·90 ♀. Yucatan and Nicaragua.

Very distinct from the species described from Cape St. Lucas by the characters above given. The thorax is evenly rounded, the posterior angles rectangular, without being prominent as in *gracilis* Lec. The base is finely margined by a line not reaching the angles; in front of this a slight transverse elevation, in front of which is an indistinct transverse impression. In the female these characters are better marked than in the male. The antennæ are shorter and much more robust; in the male they equal in length the head and thorax. The front is deeply notched both in male and female, exposing the connecting membrane between the epistome and labrum, exhibiting sexual characters similar to Zophobas. The anterior tibiæ of the male are clothed internally near the tips with a dense, short pubescence. In this species the prosternum is slightly produced behind the coxæ, acute. Mesosternum declivous and broadly channeled.

Between this genus and Zophobas there appear to exist close affinities.

On the Consumption of Force by Plants in overcoming Gravitation.

BY THOMAS MEEHAN.

Every one interested in Horticulture knows how uncertain is the successful cultivation of the grape in the United States. The vines usually flourish well for a few years, but in most instances become the prey of numerous diseases before they attain any very great age.

In remarkable contrast with this general failure is the fact that grape vines growing over trees are generally healthy and fruitful to a remarkable extent. Branches from unhealthy vines on trellises, when they can get to ramble over the twiggy branches of a neighboring tree, resume the health and vigor lost by the parent or main vine.

These facts have had numerous observers, and are generally admitted. They have been frequently discussed in Horticultural journals; but every theory hitherto brought forward has been refuted. For instance, it has been suggested that the partial shade afforded by the tree benefitted the grape vine; but it is as perfect when growing over low bushes, on hot banks, exposed to high and dry temperatures, as when luxuriating among the shady branches of the tallest trees. Again, it has been suggested that as the vine is supposed to like a dry soil the roots of the tree tended to absorb superfluous moisture, and thus furnished the best conditions for the vine roots; but healthy vines are found on trees in impassable swamps: besides, the cases of branches from trellises before alluded to answer this supposition. Some have thought that as the foreign vine, growing under glass, thrives there so well principally on account of the humid atmosphere, the evaporation from the trees' foliage might benefit the vine growing over it; but it has been further observed that they grow as well over dead trees as over living ones: and so on, in like manner, every theory has been refuted, and the true reason unexplained.

I think Mr. Darwin's discovery of tendril motion will afford the key to this phenomenon, and enable us to form a new theory as to the origin and employment of force in vegetable growth.

Mr. Darwin has shown that the tendrils of plants are in continuous motion for a long time until they find something to cling to, when motion at once

ceases. Motion is an attribute of vital force; and vital force, whatever be its origin, must be sustained by nutrition.

There are two forms of motion. The one we call growth, which is the motion of the cells individually; the other, in animals, we call muscular motion, is the movement of the cells collectively. This tendril motion, unnamed because until lately unknown, is analogous to animal muscular motion, in its being a collective movement of the parts.

In animals we know that nutrition will only supply a given amount of force, and that if muscular motion receives an undue proportion of this force, growth (cell motion) suffers. In common language, the over-run horse gains no flesh. On the other hand, the disuse of muscular power fattens the animal. If the same division of motion exists in plants, and Mr. Darwin's paper shows it does, it necessarily follows that if one form gets more than its due share, the healthful balance is destroyed—in other words, the force necessary for excessive tendril motion in the grape vine exhausts the nutritive powers of the plant to supply; growth suffers, and disease ensues.

To apply this principle to the case of unsuccessful grape culture, we find in no system of grape management is any provision made for arresting tendril motion,—but on the tree thousands of little twigs invite the tendrils at every turn. No motion is expended except for what we might almost term healthful exercise,—the balance is used in growth.

Observation on many species of climbing vines under similar circumstances confirms these views. The growth and general healthfulness of every kind of vine, is in exact proportion to the climbing facilities afforded it. The garden pea will furnish a ready means of testing this proposition. It will be found that difference in vigor, general healthfulness, and longevity, is strikingly in favor of those grown on twiggy branches. Peas unstaked grow weakly, bear early and sparingly, and die young. Honeysuckles ramble to great heights and have large luxuriant foliage on fine wire trellises, but when dangling to one straight stick they grow very little indeed. The most striking instance that came under my observation was in some *Wistaria sinensis* which had been trained to form self-supporting dwarf trees. The branches would only grow two or three feet in a season, but a few of the shoots in time bending over and reaching the ground, where they found a natural support, would grow thirty feet during a single season. The observations in this way were so uniform, and the materials being everywhere, any one can verify this without it being necessary for me to particularize further instances.

Every effort of nature is but an endeavor to accomplish an object. The history of a plant's life is a struggle with gravitation. The purpose of that struggle is with the Author of its existence, but its immediate object is to elevate itself from the earth. The force required for this is very great. In its young days, however, it goes on with vigor,—taking no thought, as it were, of to-morrow,—but, as it grows older, it becomes bowed down by the weight of its own accumulations; gravity tells on its wide-spreading branches, reminding it of its growing weakness. It then prepares itself for its final dissolution by producing fruit, which, fully accomplished, the struggle with gravitation ceases, and dust to dust returns.

The whole of this enormous motive force must, as we have seen, be derived from nutrition,—and the proper proportion due to each form of motion must be provided and paid to it, or deranged action be the inevitable consequence.

A second study of the ICTERIDÆ.

BY JOHN CASSIN.

2. Sub-family QUISCALINÆ.

I. Genus QUISCALUS, Vieillot.

(Genus Quiscalus, Vieill., Analyse, p. 36.)

1. *Quiscalus.*

1. QUISCALUS PURPUREUS, (Bartram).

"Gracula purpurea, Bartram," Wilson Am. Orn. iii. p. 44.
Gracula purpurea, Bartram, Trav. Florida, p. 289 (1791).
Monedula purpurea, Catesby, Carolina, i. p. 12, pl. 12.
Gracula quiscula, Linn. Syst. Nat., i. p. 109 (1758).
Oriolus ludovicianus, Gm. Syst. Nat., i. p. 387 (1788)?
Quiscalus versicolor, Vieill. Nouv. Dict., xxviii. p. 488 (1819).
Quiscala nitens, Licht. Verz., p. 18 (1823).
Quiscalus purpuratus, Sw. Cab. Cy., p. 298 (1838).

Catesby Carolina, i. pl. 12. Vieill. Gal. i. pl. 108. Wils. Am. Orn. iii. pl. 21. Aud. B. of Am. pl. 7; oct. ed. iv. pl. 221. Bonap. Am. Orn. i. pl. 5.

One of the most abundant of the larger insessorial birds of Eastern North America, retaining its place in the most highly cultivated districts, associated in societies at all seasons, and in the migrating periods, especially in autumn, appearing in immense flocks in the Middle and Southern States. Numerous colonies remain during the summer, and rear their young within the corporate limits of Philadelphia, and resort constantly to the public squares (or parks) in the most densely populated parts of the city, for the purpose of feeding on the larvæ of insects, especially of species of Lepidoptera, which infest the trees. In some instances small parties have built nests and reared young in the public squares of this city, but this bird evidently prefers the suburbs and open country.

Bill about the length of the head, thick at base, curved at the end, edge of upper mandible generally sinuated, commissure nearly straight, but curved downwards distinctly at the point; wing moderate, with the third quill usually slightly longest, but frequently about equal to the second and fourth; tail rather long, graduated; legs and feet rather strong; claws strong and sharp. Total length 11½ to 13 inches; wing 5 to 5½; tail 5½ to 6 inches.

Adult male. Entirely black, head, neck and breast with a fine steel-blue, greenish-blue or violet-blue lustre, abruptly terminated on the neck behind, extending on the breast in front, but abruptly terminated and giving place to the fine golden and bronzed violet-blue, purple and green of the abdomen, which are very nearly the same on the back and other upper parts of the body. Coverts of the wing and shorter quills with fine bronze and bluish-purple lustre, primaries narrowly edged with purple or bluish. Tail usually with a fine blue lustre, but frequently changing to green; bill and feet black.

The lustres of the plumage in this species (and in the next succeeding) change in a considerable degree in different lights, and have an almost unlimited variation in different ages and seasons, and even in individual specimens of the same age apparently, and are difficult to describe. Frequently the blue of the head and throat presents a green mixture or dominant lustre of that color; there is occasionally a well defined band on the back of the neck of a fine golden and green lustre, and also frequently a large mixture of blue in the lustres of the abdomen; and lastly, the plumage of the back and abdomen presents all these lustres with the feathers edged or tipped with fine golden, green or violet, forming a singular iridescent character.

Adult female. Smaller than the male, with the lustres of the plumage

generally similar, but with generally a greater prevalence of green, and a paler violet lustre than in the male. Total length about 10½ to 11½ inches.

Young. Entirely dull brownish-black, with usually a green lustre beginning to appear on the head and breast, wings and tail.

Hab.—North America, east of the Rocky Mountains. Spec. in Mus. Acad. Philada. and Mus. Smiths. Inst. Washington.

Numerous specimens from various and widely distant localities in North America, in the Academy Museum and in the Smithsonian Museum. Kansas (Dr. W. A. Hammond), Hudson's Bay (Smithsonian), resident in Louisiana (Mr. Audubon). The figures of Wilson of the male, and of Bonaparte of the female, above cited, are very good representations of this species; those of Audubon are not, but seem to be of young or imperfect plumage.

2. QUISCALUS AGLÆUS, Baird.

Quiscalus aglæus, Baird, Silliman's Jour. 1866, p. 84.

Quiscalus baritus, Baird, B. of N. A. p. 556.

Baird, B. of N. A. pl. 32.

Specimens from Florida in the collection of the Smithsonian Institution. This species is allied to but distinguishable from the preceding without difficulty.

Smaller than the preceding species, with the bill comparatively longer and more slender, more gradually pointed, with the upper mandible distinctly curved downwards at the tip. Wing moderate, with the second, third and fourth quills very nearly equal; tail rather long, graduated; legs and feet strong, claws strong and sharp. Total length about 10½ to 12 inches; wing 4¾ to 5½; tail about 5 inches.

Adult male. Entirely black, head, neck and breast with a fine blue lustre, changing to a fine golden purple or violet, abruptly terminated on the neck behind, extending lower on the breast, and abruptly giving place to a silky green lustre on the abdomen, somewhat mixed or variegated with purple and violet. Back with nearly the same lustre as the abdomen; rump and upper tail coverts more variegated with golden green, violet and blue. External wing coverts with fine blue lustre, changing to green, and frequently tipped and edged with golden-green and violet. Shorter quills with fine blue lustre changing to green. Primaries narrowly edged with bluish or green. Tail with a fine green lustre; bill and feet black.

Hab.—Florida; Bahama Islands? Spec. in Mus. Smiths. Inst.

In this species the lustres of the plumage seem to be more uniform, or much less changeable or broken than in the preceding; and in all the specimens now under examination the shorter quills have a nearly uniform fine blue lustre, changing to green, and more uniform than in the preceding, and the tail has a green instead of blue lustre. These characters of the plumage, and the smaller size and longer bill, furnish characters at once available for the easy recognition of this species. It is strictly of the same subgeneric group as the preceding, and the two are the only species known to me which present variegated and iridescent lustres of plumage. The two species form a subgroup which I regard as typical *Quiscalus*.

2. *Holoquiscalus.*

All the species of this subgroup, known to me, are black, with purple or violet lustre of various shades in different species, wings and tail uniformly with greenish lustre. In any one species the lustre is nearly uniform on all parts of the head and body. These species inhabit the West Indies and the continent of America as far north as Mexico.

In the large collection of *Quiscalinæ* in the Museum of the Smithsonian Institution, from the West Indies, in which the localities are most carefully and accurately stated in the labels by Professor Baird, I have not succeeded in finding any one species from more than one of the larger Islands. In other

words, it is my conclusion that at least the larger Islands,—Cuba, Jamaica, St. Domingo and Porto Rico,—are each inhabited by a distinct species. That of Trinidad seems to be the same species inhabiting South America.

3. QUISCALUS BARITUS, (Linnæus).

Gracula barita, Linn. Syst. Nat. i. p. 165 (1766).
Monedula tota nigra, Sloane Nat. Hist. Jamaica, ii. p. 299.
Icterus niger, Briss. Orn. ii. p. 103.
Sturnus jamaicensis, Daud. Tr. d'Orn. ii. p. 317 (1800).
Merops niger, iride subargentea, Brown Nat. Hist. Jamaica, p. 476.
Quiscalus crassirostris, Swains. Cab. Cy. p. 355 (1838).
Quiscala vulgaris, Temm. Pl. Col. Tab. Meth. p. 10 (1838)?

Sloane's Jamaica, pl. 257, fig. 2. Brisson Orn. ii. pl. 10, fig. 1. Gosse B. of Jamaica, pl. 53.

1. *Gracula barita* is a name given by Linnæus in the 10th edition of Syst. Nat. i. p. 109 (1758), and he probably describes from a specimen collected by Dr. Rolander, whose name he mentions, without citing any work or manuscript and without giving locality, other than "*Habitat in Americæ Musis, cuius fructus deuastat.* Rolander," which, being interpreted, means that the locality is in those parts of America where plants of the genus *Musa* (the plantain and banana) flourish. The description, very probably, is that of a bird in plumage not mature, but of this group, and is applicable with about equal propriety to the young of any species of the subgroup here indicated as *Holoquiscalus*. Dr. Rolander visited Guiana and the Island of St. Eustatius, but published nothing relating to his ornithological collections, to my knowledge It is impossible to determine the species or the locality from Syst. Nat. 10th edition, or in any other manner in especial relation to that edition, of which the present writer is cognizant.

2. But in the 12th edition Syst. Nat. the case assumes much greater facility. In this edition, i. p. 165 (1766), Linnæus cites as synonymes "Icterus niger; Briss. Av. 2, p. 103, t. 10 f. i." and "Monedula tota nigra, Sloane Jam. 2, p. 299, t. 257, f. 2. Raj. av. 185, n. 28."

3. Brisson, in Orn. ii. p. 103, under the name *Icterus niger*, describes specimens in the collection of M. de Reaumer, from Jamaica and St. Domingo: "On le trove à la Jamaique et à St. Domingue d'ou il été envoyé a M. de Reaumer par M. Chervain." He gives as a synonym "Monedula tota nigra," Sloane, as above cited, who described, of course, from specimens obtained in "the hot and distant Island of Jamaica," and, whatever the St. Domingo bird may be, Brisson also describes and figures that of Jamaica, now well known, and usually called *Q. crassirostris*.

Sturnus jamaicensis is a name given by Daudin to the bird described under the name "*Merops niger, iride sub-argentea*," by Dr. Patrick Brown, in Nat. Hist. Jamaica, p. 476, which is undoubtedly this bird. Daudin is in error, however, when he gives "*Monedula tota nigra*," Sloane, as a different bird, though he is quite correct in applying to it the name *Gracula barita*, Linn. (Daud. Tr. d'Orn. ii. p. 320)

There is, in my opinion, sufficient evidence that this species of Jamaica is properly to be regarded as entitled to the name *Quiscalus baritus*, (Linn.) In late authors this name has usually been applied to the species from Cuba, which has no claim whatever. The present bird is stated to inhabit also St. Domingo by Mr. Gosse, in Birds of Jamaica, p. 220, but I have seen no specimens of it from that Island, nor from elsewhere than Jamaica.

Numerous specimens of this species are in the collection of the Smithsonian Institution and in the Academy Museum, and are exclusively from Jamaica. It is rather the largest of the group inhabiting the West Indies and has the bill thick in both mandibles, curved in its terminal half, commissure inflexed and curved at the end of the bill; wing long, third and fourth quills longest and nearly equal; tail long, graduated; legs and feet strong. Male larger than the female.

Adult male. Black, head and body with dark purple lustre, uniform above and below, and frequently changing to greenish on the rump, upper tail coverts and abdomen. Wings and tail above with green lustre; bill and feet black (with a brownish tinge in dried specimens). Total length about 12 to 12½ inches, wings 6, tail 5½ inches.

Adult female. Similar to the male in color and general lustres of plumage but usually with the latter more tinged with green. Much smaller than the male, total length about 10 inches, wing 5, tail 4¾ inches.

Habitat.—Jamaica. Spec. in Mus. Acad., Philada., and Mus. Smith. Inst., Washington.

4. QUISCALUS GUNDLACHII, nobis.

"Quiscalus barytus, Vieill," D'Orbigny, De Sagras Cuba. Ois. p. 120.

"Chalcophanes Baritus, Wagl." Gundlach, Cab. Jour. 1856, p. 15.

De Sagra's Cuba, Aves, pl. 18.

Numerous specimens in the Smiths. Mus. and in the Acad. Mus., exclusively from Cuba. This species is but little smaller than the preceding, the bill is more slender and more gradually pointed and the tail seems to be comparatively longer. The color of the head and body in the Cuba bird presents a more decided purple or violet lustre than in that of Jamaica, and the under parts have a fine golden purple lustre quite wanting in the species of that Island.

Similar in form and general lustres of plumage to the immediately preceding, but rather smaller; bill more pointed and more gradually tapering; tail comparatively longer. Bill longer than the head, gradually curved and pointed; wing moderate with the third and fourth quills usually longest, but frequently about the same length as the second; tail rather long, graduated, the feathers wide; legs and feet strong; claws curved, sharp. Total length about 11½ to 12 inches, wing about 6, tail 5¾ to 6¼ inches.

Adult male. Black, head and body above with a fine purple or violet lustre; under parts with a fine golden purple lustre; wings and tail above with a green lustre; smaller wing coverts purple changing to greenish; tibiæ and under tail coverts greenish; bill and feet black,

Female. Smaller. The specimens now under examination are not sufficient to be reliable in either the lustres of the plumage or dimensions in the female. Those which I regard as females are very similar to the males in lustres of plumage, and there does not appear to be so much difference in the sizes of the two sexes as in the species of Jamaica.

Hab.—Cuba. Spec. in Mus. Acad., Philadelphia, and Mus. Smiths. Inst., Washington.

It is with great gratification that I name this species in testimony of my high estimation of Dr. John Gundlach, a most excellent and accurate naturalist, who has with great ability studied and made known especially the ornithology of the Island of Cuba. The researches of this gentleman have in fact been of the greatest value in the Natural History of that Island.

5. QUISCALUS BRACHYPTERUS, nobis.

Numerous specimens in the collection of the Smithsonian Institution from Porto Rico.

This species resembles those from the Islands of Jamaica and Cuba, *Q. baritus*, *Q. Gundlachii*, especially the latter, but is smaller, with the bill more slender; the tail shorter, and the wing disproportionately shorter. The last character is the most immediately available in distinguishing from either of those species. This bird is larger than either of the succeeding in this memoir.

Bill about the length of the head, gradually tapering and curved at the tip; wing short, third and fourth quills longest; tail moderate or rather long; legs and feet strong.

Adult male. Black, the entire plumage of the head and body with a dark purple and violet lustre; wings and tail above frequently with a pale greenish

lustre, but quite generally purplish or lustrous black. Bill and feet black. Total length about 11 inches, wing 5, tail 4½ to 5 inches.

Adult female. Similar to the male in colors, but smaller; total length about 9½ to 10 inches, wing 4½, tail 4 inches.

Hab.—Porto Rico. Spec. in Mus. Smiths. Inst., and Mus. Acad., Philada.

Sixteen specimens of this species are in the Smiths. Mus. from the Island of Porto Rico and one specimen from the Massena collection without label, in the Acad. Mus. It resembles other species of this group in colors and lustres of plumage, being most nearly related to those above mentioned from Jamaica and Cuba, with which it has usually been confounded. It is distinguishable without difficulty, on examination, by its short wings and tail. This is undoubtedly the species alluded to under the name "*Quiscalus barita*," by Mr. E. C. Taylor in Ibis, 1864, p. 168, and stated by him to be very abundant in Porto Rico.

6. QUISCALUS NIGER, (Boddaert.)

Oriolus niger, Bodd. Tab. Pl. Enl. p. 31, (1783.)

Troupiale noir, de St. Domingue, Buffon, (name on plate.)

Le Troupiale noir, Buff. Pl. Enl. iii., p. 241.

Buff. Pl. Enl. 534.

Specimens of both sexes in the Smiths. Mus. from the Island of St. Domingo or Hayti, and distinct specifically from either of the preceding or any other species known to me. This is, in my opinion, undoubtedly the bird figured by Buffon as cited above, but not with entire success, the tail not being sufficiently "étagée," though so described in his text. This figure is about the size of the female; the bill and feet are too lightly colored. It probably represents the female in plumage not mature.

This species is smaller than either of the preceding, the male being rather smaller than the female of the Cuba species, *Q. Gundlachii*, and the female (in this species) much smaller than the male. The bill is straight, and gradually pointed, not curved, more slender than in either of the preceding, and the commissure nearly straight; wing moderate, third and fourth quills longest and nearly even; tail rather long, graduated; legs and feet rather strong. Easily distinguished from either of the preceding by its straight, sharp bill.

Adult male. Black, head and body with a dark purple lustre nearly uniform above and below; wings and tail above with a green lustre. Bill and feet bluish black. Total length about 10½ inches, wing 5, tail 4½ inches

Adult female. Similar to the male in color and lustres of plumage. Smaller, total length about 9 inches, wing 4½, tail 4 inches.

Hab.—St. Domingo. "Jeremie." Spec. in Mus. Smiths. Inst., Washington.

7. QUISCALUS INFLEXIROSTRIS, Swainson.

Quiscalus inflexirostris, Swains. Cab. Cy. p. 300, (1838.)

Cab. Cy. fig. 52, (wood cut.)

One specimen only in the Acad. Mus. seems to be this species, but which is, unfortunately, without label stating locality. The bill is exactly the length and otherwise very nearly as given by Mr. Swainson as cited above, though somewhat thicker. It is the only specimen that I have ever seen in which the commissure is an uninterrupted curve or arc of a circle,—not straight nor sinuated as in all other species known to me (except *Q. niger* of St. Domingo) and described in this memoir. It is apparently adult, but probably in not quite mature plumage.

Male nearly adult? Bill rather longer than the head, curved, the upper and under mandibles nearly equal in thickness, commissure curved and the edges of both mandibles inflexed; wing moderate, second, third and fourth quills longest and very nearly equal; tail moderate or rather long, graduated; legs and feet strong. Total length about 10 inches, wing 5, tail 4½ inches, tarsus about 1½, chord of upper mandible about one and four-fifths inches.

Black, entire plumage of head and body with a dark purple lustre; wings

externally with a green lustre. In the present specimen, which is probably not fully mature, the tail is plain black. Bill and feet black, the latter (feet) brownish; claws strong, brownish black.

Hab.—Unknown. Spec. in Mus. Acad., Philadelphia, from the Massena collection.

The lustres of the plumage in this species are generally similar to those of all the other species of the sub-group here designated *Holoquiscalus*, but the purple is rather darker than in either. The specimen now described is probably not mature in plumage, and the lustres of the plumage, therefore, not entirely reliable as characters.

Of all the specimens that I have seen of *Quiscali*, this comes the nearest to Mr. Swainson's description and figure of *Q. inflexirostris*, and in fact there is no other that I can suspect as possibly that species, on account of the peculiarly curved bill. No locality is known to me, and at this time I do not remember ever having seen the species mentioned by any writer since Swainson.

8. QUISCALUS LUGUBRIS, Swainson.

Quiscalus lugubris, Swains. Cab. Cy. p. 299, (1838.)

Chalcophanes minor, Cabanis Mus. Hein. i., p. 297, (1851)?

Cab. Cy. fig. 54 c.

This is another of the species of this difficult group, with the lustres of the plumage uniform purple on the head and body, and green on the wings and tail. It is rather smaller than the species immediately preceding (*Q. inflexirostris*) and decidedly smaller than all others preceding. Specimens from Trinidad and South America in the Acad. Mus., Philada.

Adult male. Bill about the length of the head, commissure nearly straight, but rather abruptly curved at the point; wing rather long, third and fourth quills longest and nearly equal; tail rather long, graduated; legs and feet strong. Total length about 9½ to 10 inches, wing 4½ to 4¾, tail 4 to 4½ inches.

Black, entire plumage of the head and body with a rich purple or violet lustre tinged with golden; shorter wing coverts or shoulders purple; wings and tail and upper and under tail coverts with a green lustre; bill and feet black.

Hab.—South America. Island of Trinidad. Spec. in Mus. Acad., Philada.

The largest specimen now before me is from Trinidad, all the measurements of which are rather larger than as given by Mr. Swainson in his description, as above cited. The smallest is probably from Brazil, and is that which at present I regard as described by Dr. Cabanis as *C. minor* as above. In all the species of this group, of which I have series of specimens, there is some diversity of size, and, finding no other appreciable character than this diversity in the specimens now under examination, I regard them as one species. This bird seems to be the most common species of South America and of the Island of Trinidad.

9. QUISCALUS MEXICANUS, nobis.

A single specimen in the Acad. Mus., selected with other birds from a large collection made in Mexico by M. Bruzin, is different from either of the preceding species. It is one of the smaller species and most resembles the immediately preceding (*Q. lugubris*), but is rather larger and has the bill much stronger and more curved. Its colors and lustres are nearly the same as that species, but seem to be of a richer golden-purple lustre on the under parts (as in some species of *Molothrus* and in *Q. Gundlachii* of Cuba.)

Adult male. Bill longer than the head, thick, curved, especially in the terminal third of its length; wing moderate, second and third quills longest; tail moderate, graduated; legs and feet strong. Total length 9¾ to 10¼ inches, wing 4¼, tail 4¼ to 4½ inches.

Black, entire plumage of the head and body with a rich golden purple or violet lustre, especialy on the neck behind and breast; shoulders bluish purple; wings and tail and under tail coverts with green lustre; the upper tail coverts

also show a green lustre in some lights, but are tinged also with purple; bill and feet black.

Hab.—Mexico. Spec. in Mus. Acad., Philada.

10. QUISCALUS RECTIROSTRIS, nobis.

This is a small species, of which one specimen is in Acad. Mus. without label stating locality. It is quite distinct from any other, though of the same general colors or lustres of plumage and is strongly characterized by its straight, slender and sharp bill. It is smaller than either of the preceding, though the present specimen may be a female.

Bill straight or very slightly curved at the tip, slender, gradually tapering, pointed, under mandible rather the thicker, commissure straight, edges inflexed; wing moderate, third and fourth quills longest and nearly equal; tail rather long, graduated; legs and feet moderate; claws curved, sharp. The tail is scarcely as long, proportionately, as in other species of this sub-group, and the legs, toes and claws rather more slender. Total length about 9½ inches, wing 4½, tail 4 inches. Female?

Adult? Black, entire plumage with a dark purple lustre very slightly changing to greenish on the wings and tail. Bill and feet black. In the specimen now described the shorter quills and wing coverts have the same purple lustre as the body, while the edges of the primaries have a faint green lustre scarcely preceptible, in which character this bird is peculiar in this sub-group. In this specimen the under mandible is pale at the base, and the quills on their under surface have a brownish tinge.

Hab.—Unknown. Spec. in Mus. Acad., Philada.

This is a quite peculiar species, easily recognized amongst the birds described in this memoir, by its straight slender bill. It seems also to have more slender legs and feet and perhaps rather shorter tail than usual, though these characters are scarcely to be relied on in prepared and dried specimens. The entire plumage in mature age, has, I suspect, an entirely uniform dark purple lustre, including wings and tail, or perhaps slightly greenish on those parts only.

The seven species last above given (Nos. 3. to 10 of this memoir) are all that I consider myself justified in regarding as entitled to be established and belonging to this sub-group, which I have designated *Holoquiscalus*. In the Academy Museum, however, there are several specimens in plumage not mature, but probably of this sub-group, which I cannot refer to either of these species and my present opinion is that there are other species yet unknown.

3. *Megaquiscalus.*

The species of this sub-group are the largest of the genus *Quiscalus*. They are easily recognized by their size, robust organization and long and graduated tails.

11. QUISCALUS MAJOR, Vieillot.

Quiscalus major, Vieill. Nouv. Dict. xxviii., p. 487, (1819.)
Gracula quiscula, Bartr. Trav. p. 290.
Gracula barita, Wils. Am. Orn. vi., p. viii.
Quiscalus corvinus, Swains. Cab. Cy. p. 300, (1838.)
Bonap. Am. Orn. i. pl. 4. Aud. B. of Am. pl. 187, Oct. ed. iv., pl. 220.

Numerous specimens from Georgia, South Carolina and other States and localities in southern North America are in the the Acad. Mus. and also in the Mus. Smiths. Specimens in Mr. Xantus' collection from Colima, Western Mexico, seem to be this species, though not in mature plumage and may be nearly allied only.

Form rather lengthened but robust; bill strong, about the length of the head; wing rather long, second and third quills usually longest, though the

first four quills are frequently nearly equal; tail long, graduated, lateral feathers about 2½ inches shorter than the central; legs and feet strong.

Adult male. Black, head and neck with a fine purple lustre, rather abruptly defined on the lower part of the neck behind and succeeded by a fine green lustre which passes into a purple or steel blue on the lower back and upper tail coverts. On the under parts the purple lustre of the head and neck passes more gradually into green on the abdomen; under tail coverts usually purplish blue, frequently plain black. Smaller wing coverts with green lustre; larger coverts greenish bronzed; quills frequently plain black, with a greenish or bronzed edging and slight lustre. Tail usually with a slight bluish or greenish lustre, frequently plain black. Bill and feet black. Iris yellow. Total length about 15 inches, wing 7, tail 6½ to 7 inches.

Adult female. Smaller. Upper parts dark brown, lighter on the head and neck behind; darker and nearly a dull black on the lower part of the back and upper tail coverts; under parts lighter, dull yellowish brown; tibiæ and under tail coverts darker; wings and tail dull brownish black; upper parts frequently with a slight greenish lustre. Total length about 12½ inches, wing 5½ to 6, tail 5½ inches.

Hab.—Southern North America. Spec. in Mus. Acad., Philada., and Mus. Smiths. Inst., Washington.

12. QUISCALUS ASSIMILIS, Sclater.

Quiscalus assimilis, Sclater, Cat. Am. Birds, p. 141, (1862.)

"Q. nitenti-niger, capite undique cum pectore purpurascentibus: long. tota in mari 13·0, alæ 6·7, caudæ 7·0, in fæm. 10·0, alæ 5·2, caudæ 5·3, poll. Angl. et dec."

"Obs. Affiniss. *Q. majori*, sed crassitie minore et colore magis violaceo distinguenda." Sclater, as above.

Hab.—Bogota. Spec. in coll. Dr. Sclater, London.

This species I have not seen.

13. QUISCALUS MACROURUS, Swainson.

Quiscalus macrourus, Swains. Cab. Cy., p. 299, (1838.)

"Quiscalus caudatus," Name on specimen in Massena collection.

Baird B. of N. A. pl. 58. Rept. U. S. and Mex. Bound. Surv. pl. 20.

Specimens from Texas, Panama and Vera Paz in the Acad. Mus. and from Texas, Mexico, Yucatan, Guatemala, and Turbo, and Carthagena, New Grenada, in Mus. Smiths. Inst. In the large number of the Smithsonian collection, probably representing all ages and stages of plumage, there is some variation in size and in the shades or lustres of apparently adult males, but I have not determined reliable characters for more than one species. This bird seems to inhabit all of Central America and the adjacent countries of both North and South America.

The largest species of this genus. Form lengthened but robust; bill strong, longer than the head; wing long, third quill usually longest; tail long, graduated, outer feathers three to five inches shorter than those in the middle; legs and feet strong.

Adult male. Black, head, neck, back and entire under parts with a fine bluish purple lustre; lower part of back and the upper tail coverts and also the abdomen and under tail coverts frequently with green lustre, though in specimens apparently not fully adult those parts are sometimes bluish bronze, inclining to dark steel blue. Wings and tail with a slight purplish lustre, smaller coverts with bluish green and larger coverts with greenish bronzed lustre. Bill and feet black. Iris yellow. Total length 17½ to 20 inches, wing about 8, tail 8 to 10½ inches.

Female. Smaller, and generally resembling the female of *Q. major*, but darker colored above. Entire upper parts dark brown, nearly black and with a green lustre on the back; wings and tail dull brownish black. Under parts light, dull yellowish brown; paler on the throat and with a trace of narrow

dark line from each side of the lower mandible. Tibiae and under tail coverts dark brown. Total length about 13 inches, wing 6, tail 6½ inches.

Hab.—Southern North America and Central America. Spec. in. Mus. Acad., Philada., and Mus. Smiths. Inst., Washington.

14. QUISCALUS TENUIROSTRIS, Swainson.

Quiscalus tenuirostris, Swains. Cab. Cy. p. 299, (1838.)

"Quiscalus orizivorus." Name on spec. in Massena collection.

Swains. Cab. Cy., fig. 51, b. c.

Specimens in Acad. Mus., without labels, from the Massena collection and one specimen from Mexico in the Smiths. Mus., undoubtedly of this species and clearly distinct from either of the preceding. The females are much lighter colored than those of either *Q. major* or *Q. macrourus*, and easily to be distinguished, and in this species the slender bill is a strong and apparently reliable character. It is carefully given by Mr. Swainson as above cited, and his description is quite sufficient for the identification of the species.

About the size of *Q. major;* form lengthened and not so robust as in either of the preceding; bill much more slender, nearly straight; wing long, third quill longest; tail long, graduated, outer feathers about 3 inches shorter than those in the middle of the tail; feet and claws more slender than in the preceding species.

Adult male. Black, the entire plumage with a fine purple lustre inclining to steel blue on the wing coverts and upper tail coverts. Wings and tail with a slight bluish lustre. Bill and feet black. Total length about 15 inches, wing 6½ to 7, tail 8 inches.

Female. Generally resembling the females of the preceding two species, but much lighter colored. Head above and neck behind light brown, inclining to chestnut or bay color; back, wings and tail dark brown, or nearly brownish black. Under parts light, dull yellowish brown, much paler on the throat; tibiae and under tail coverts dark brown. Total length about 11 to 12 inches, wing 5¼, tail 5½ to 6 inches.

Hab.—Mexico. Spec. in Mus. Acad., Philada., and Smiths. Inst., Washington.

This is an entirely respectable species, though apparently not much known to naturalists. It belongs strictly to the sub-group of *Quiscalus* to which the name *Megaquiscalus* is given in this memoir, all the species of which are characterized by their large size and long tails. This bird is easily recognized by its slender bill, and in the adult male the lustre appears to be nearly uniform purple with little change or variation in any exposure to the light. The female can easily be distinguished from that of either of the preceding by its lighter colors, and especially by the quite different color of the head above and neck behind. In one female specimen in the Massena collection the throat might be described as dull yellowish white, and the entire under parts of the body but little darker. One female specimen in the Mus. Smiths., undoubtedly from Mexico, clearly determines the locality of this species.

15. QUISCALUS PALUSTRIS, (Swainson.)

Scaphidurus palustris, Swains. Philos. Mag., 1827, p. 437.

In one of the interesting and valuable collections from North Western Mexico, sent to the Smithsonian Institution by Col. A. J. Grayson, late of the United States Army, I am greatly gratified to find two specimens of a species quite unknown to me previously, and which seem to be the Mexican bird described by Swainson as above cited. These specimens are not in adult plumage and are not quite so large as the dimensions given, but they are evidently assuming the colors as given in the description, and I have no doubt are the species. From Mazatlan, Mexico.

Mr. Swainson's description is: "Glossy blue black; thighs brown; bill slender, commissure straight; legs slender; claws long, slightly curved. Total length 15 inches, bill 1 7-10, wing 6½, tail 7½, tarsi 1¾ inches."

"Inhabits the marshes and borders of the lakes round Mexico in flocks. M.

Vieillot's name for this group, *Quiscalus*, being already used in botany, I propose to call it *Scaphidurus*, as expressive of the singular boat-shaped tail common to most, if not all, of the species."

The specimens now before me are probably very nearly full grown, but have not entirely assumed the "glossy blue black," though that color is plainly superceding the immature plumage. The brown of the *tibiæ* is to be seen in both specimens.

Both of Col. Grayson's specimens are males. About the size of *Q. major;* wing rather shorter; tail long; bill thick, nearly straight, slightly curved at the point; legs and feet strong.

Hab.—Mazatlan, Mexico. Spec. in Mus. Smiths. Inst., Washington.

16. QUISCALUS PERUVIANUS, Swainson.

Quiscalus Peruvianus, Swains. Cab. Cy. p. 354 (1838).

"Bill one inch and a-half long. Plumage glossy purple on the head and neck, changing to green on the body beneath; back, wings and tail black, with an obscure greenish gloss. Total length about 13½ inches; bill from the gap $1\frac{7}{10}$, front 1½, wings 7¼, tail from the base 7¾, tarsus nearly 2, middle toe and claw $1\frac{7}{10}$, hinder claws 1¾. Commissure of the bill slightly sinuated in the middle. The purple of the head and part of the neck gradually becomes steel blue on the breast, and then assumes a greenish tinge on the interscapulars and under part of the body. The greater wing coverts, quills, back, rump, and tail are almost entirely glossy black."

"Inhabits Peru. Mr. W. Hooker's collection, Mus. Nost."

This is Mr. Swainson's description, as above cited. This species I have not seen, though it is given in Mr. Jules Verreaux's Catalogue of the Baron Lafresnaye's collection, recently presented to the Boston Natural History Society by Dr. Henry Bryant, but which, I regret to say, I have not examined.

4. *Hypopyrrhus.*

(Genus Hypopyrrhus, Bonap. Consp. Av. p. 425.)

17. QUISCALUS PYROHYPOGASTER, (De Tarragon).

Cassicus pyrohypogaster, De Tarr., Rev. Zool. 1847, p. 252.

"Agelaius pyrrhogaster, (Tarrag.)" Gray Gen. iii. app. p. 15.

General form robust, plumage of the head with acicular feathers, and somewhat rigid; wing moderate, third and fourth quills longest; tail rather long, rounded; legs and feet rather short, strong; bill about the length of the head, thick at base, curved slightly at the point. Wide abdominal transverse band and under tail coverts bright scarlet, all other parts of the plumage black. Acicular feathers of the head and throat lustrous, but other parts plain black. A few axillary feathers scarlet. Bill ard feet brownish-black.

Total length about 11 inches, wing 5¼, tail 5½ inches.

Hab.—Northern South America; New Grenada. Spec. in Mus. Acad. Phila.

This singular bird is easily recognized by its scarlet abdominal band and under tail coverts, and plain black general plumage. It is evidently of this group, but possibly entitled to generic distinction.

II. Genus SCOLECOPHAGUS Swainson.

(Genus Scolecophagus, Swains. Faun. Bor. Am. ii. p. 494.)

1. *Scolecophagus.*

1. SCOLECOPHAGUS FERRUGINEUS, (Gmelin).

Oriolus ferrugineus, et niger, Gm. Syst. Nat. i. p. 393 (1788).

Turdus hudsonius, et labradorius, Gm. Syst. Nat. i. p. 818, 832 (1788).

Pendulinus ater, Vieill. Nouv. Dict. v. p 320 (1816).

Wilson Am. Orn. iii. pl. 21. Aud. B. of Am. pl. 157; oct. ed. iv. pl. 222.

An abundant species of Eastern North America, specimens of which are

common in collections, but of considerable variation in colors in plumages not mature. Tail of moderate length, rounded at the end; wing rather long, pointed, second quill longest; bill shorter than the head, much more slender than in *Quiscalus*, pointed; legs and feet rather strong; claws slender, sharp.

Adult male. Black, with greenish-purple lustre on the head and body, especially on the under parts, wings and coverts, rump, upper and under tail coverts; abdomen and tail with green lustre. The green lustre frequently extends over the back or entire upper parts of the body. Plumage usually more or less edged and tipped with ferruginous, especially in autumn, which frequently is so strongly marked as to give the prevailing color. Total length 9 to 9½ inches, wing 4¾, tail 4 inches.

Female. Dark plumbeous or ashy-black; wings and tail with green lustre. Back usually with a greenish lustre; quills usually edged with ferruginous. Smaller than the male. Total length about 8 inches; wing 4½, tail 3½ inches.

Young. Head and body dull ferruginous; paler on the under parts; stripe over the eye pale dull ochre; wings and tail black, with greenish lustre.

Hab.—Eastern North America. Spec. in Mus. Acad. Philada. and Mus. Smiths. Inst. Washington.

2. *Euphagus.*

2. SCOLECOPHAGUS CYANOCEPHALUS, (Wagler).

Psarocolius cyanocephalus, Wagl. Isis, 1829, p. 758.
Scolecophagus mexicanus, Swains. Cab. Cy. p. 302 (1838).
Quiscalus Breweri, Aud. B. of Am., oct. ed. vii. p. 345 (1843).
Aud. B. of Am., oct. ed. vii. pl. 492.

This is a common species of Central and Western North America and Mexico, of which numerous specimens are in the Smiths. Mus. and Acad. Mus.

Bill shorter than the head, thick at the base, conical, pointed; wing long, pointed, second quill longest; tail moderate, rounded; legs and feet rather slender. Total about 9½ to 10 inches; wing 5 to 5¼, tail 4¼ to 4½ inches. Sexes nearly of the same size.

Adult male. Black, head only with bluish violet or purple lustre, all other parts with fine green lustre; bill and feet black.

Female. Dull brown, with a plumbeous tinge, lighter on the head and breast, and frequently tinged with rusty or dull yellowish; back darker: tail and wings generally with greenish lustre. The young of both sexes have nearly the entire plumage dull rusty brown, especially the head and under parts of the body, but more as a color of the plumage, as in *Molothrus*, than with the feathers merely edged, as in *S. ferrugineus*.

Hab.—Central and Western North America, Texas, Mexico. Spec. in Mus. Acad. Philada. and Mus. Smiths. Inst. Washington.

3. *Dives.*

3. SCOLECOPHAGUS DIVES, (Bonaparte).

Lampropsar dives, Bonap. Consp. Av. i. p. 425 (1850).
"L. Dives, Caban.," Bonap. ut supra.
Lampropsar dives, Cabanis, Mus. Hein. i. p. 194 (1851)?
Quiscalus Sumichrasti, De Saussere, Rev. et Mag. Zool. 1859, p. 119.
Rev. et Mag. Zool. 1859, pl. 3, fig. 2, 3.

Apparently an abundant species of Mexico and Central America, of which numerous specimens are in the Smiths. Mus. and Mus. Acad.

Bill about the length of the head, straight, thick, pointed; wing moderate or rather short, third, fourth and fifth quills longest, and generally nearly equal; tail moderate, rounded; legs and feet strong.

Adult male. Black, with a weak greenish lustre in the entire plumage. Bill and feet black. Many specimens would be regarded properly as only shining black, the green lustre being scarcely perceptible. Total length 11 to 12 inches; wing 5, tail 5 inches.

Female. Smaller; total length 10 to 10½ inches. Colors quite similar to those of the male, but of rather duller black.

Hab.—Mexico, Central America. Spec. in Mus. Acad. Philada. (since about 1840!) and Mus. Smiths. Inst. Washington.

4. SCOLECOPHAGUS ATROVIOLACEUS, D'Orbigny.

Quiscalus atroviolaceus, D'Orb. La Sagra's Cuba, Orn. p. 121 (1839).

La Sagra's Cuba, Aves, pl. 19.

Apparently confined to the Island of Cuba. This is another of the robust species, with the bill short and thick, and tail of moderate length and rounded at the end.

About the size of, and general form very similar to the last species (*S. Dives*), but with the wing longer (and lustre of plumage entirely different). Bill strong, thick at base, and rather abruptly tapering, pointed; wing moderate, third and fourth quills longest; tail rather long, rounded; legs and feet strong.

Adult male. Black, the head and entire body above and below with rich violet or purple lustre; wings and tail with green lustre. Shorter quills edged with violet, smaller wing coverts violet, greater coverts and quills edged with green. Bill and feet black. The entire plumage having a fine silky character. Total length 10 to 10½ inches; wing 5½, tail 4½ inches.

Female. Smaller; total length about 9 to 9½ inches. Black, with the lustres of the plumage very nearly as in the male.

Hab.—Cuba. Spec. in Mus. Acad. Philada. and Mus. Smiths. Inst. Washington.

5. SCOLECOPHAGUS ÆQUATORIALIS (Sclater.)

Quiscalus æquatorialis, Sclat. Cat. Am. Birds, p. 140, (1861.)

"Ps. cayennensis. Amer. Merid." Label in Massena coll.

One specimen from the Massena collection in the Acad. Mus. seems to be this species, though not in all particulars corresponding with Dr. Sclater's diagnosis, as above cited. It is smaller than either of the preceding species of the subgroup herein designated *Dives*.

"Q. nigrosericeus unicolor, æneo-nitens, alis intus brunnescentioribus; long. tota 9·5, alæ 4·4, caudæ 3·8, rostri a rictu 1·05, poll. et dec. Angl. ♀ mari sim. sed minor."

"Obs. Affinis speciei præc. (*Q. Sumichrasti*) et quoad formam similis, sed crassitie minore."

"*Hab.*—Babahoyo." (Sclater, as above.)

III. Genus IDIOPSAR, nobis.

In the collection of the Smithsonian Institution I find a specimen of a very interesting and singular bird, evidently *Icterine*, and allied to *Quiscalus* and *Scolecophagus*, but not to be referred with any considerable degree of propriety to either of those or to any other genus of this group. The tail is short, nearly even at the end, and emarginate, and the wings long. General form short and compact, bill about the length of the head, strong, slightly curved, with the commissure much inflexed in both mandibles, culmen distinct. Legs and feet moderate.

1. IDIOPSAR BRACHYURUS, nobis.

Entire plumage of the head and body bluish cinereous or plumbeous, darker on the upper parts and lighter on the under parts, nearly white at the base of the under mandible, quills dark ashy brown, primaries edged externally with light ashy nearly white; tail feathers dark brown, nearly black, edged with light ashy. Lower abdomen or ventral region light ashy nearly white. Bill dark horn color, under mandible lighter, especially at the base. Tarsi and toes light brown.

Total length about 7½ inches, wing 4, tail 2¾, bill 1 inch.

Hab.—Bolivia. "La Paz." Mus. Smiths. Inst. Collected and presented by Mr. D. K. Cartter.

[Dec.

IV. Genus POTAMOPSAR, Sclater.

(Subgenus Potamopsar, Sclater, Cat. Am. Birds, p. 141.)

1. POTAMOPSAR MINOR (Spix.)

Icterus minor, Spix Av. Bras. i. p. 67 (1824.)

Spix Av. Bras. 1 pl. 63, fig. 2.

Frontal feathers short, erect and rigid. Bill shorter than the head, rather slender, and abruptly tapering, pointed; wing rather short, third, fourth and fifth quills longest and nearly equal; tail rather long, graduated; legs and feet moderate, or rather slender.

Total length about 9 inches, wing 4, tail 4 inches.

Adult male. Entirely bluish black, with little or no lustre and nearly uniform on all parts, including the wings and tail. Bill and feet black.

Hab.—Rio Napo (Mr. Lawrence), Rio Javarri (Mr. J. Verreaux).

It is perhaps expedient to follow Dr. Sclater in regarding this bird as *Icterus minor*, Spix, as above cited, but neither the figure nor description of that author will quite establish its claims satisfactorily. If really the species of Spix, it is one of his worst figures and descriptions, which is saying much!

This is a rare species in American collections, the only specimens that I have seen being one in the Smiths. Mus., from Mr. Verreaux, labelled "Rio Javarri," and another, in my friend Mr. Lawrence's collection, labelled "Rio Napo," both undoubtedly correct.

V. Genus CASSIDIX, Lesson.

Genus Cassidix, Less. Traite d'Orn. i. p. 433 (1831.)

Genus Scaphidurus, Swains. Faun. Bor. Am. ii. p. 494 (1831) and Scaphidura, Swains. Cab. Cy. p. 273 (1837), but not Philos. Mag. 1827, p. 436, which is *Quiscalus*.

This is a group easily distinguished generically, especially by the strong bill flattened above, and in adult plumage by the somewhat lengthened and probably partially erectile plumage of the neck. The color is black in all the species, and in my opinion is always lustrous in the adults of both sexes. In the young of all species known to me the color is dull or plain black. Specimens in plumages not mature are much the more common in all collections, and such have been repeatedly described, but very doubtfully to the comfort of the student. It is quite impossible for me to coincide with those authors who regard this group as but one species, and that by a name which is of quite doubtful application to any!

1. CASSIDIX ATER (Vieillot.)

Cassicus ater, Vieill. Nouv. Dict. v. p. 363 (1816.

Psarocolius palliatus, Wagler Syst. Av. No. 4 (1827.)

Del Grande, Azara, Apunt. Hist. Nat. Paraguay, i. p. 273.

Scaphidura barita, Swains. Cab. Cy. p. 301 (1838.)

Scaphidura crassirostra, Swains. Cab. Cy. p. 301?

This seems to be the most common species of South America. Specimens now before me are from Brazil, Cayenne, Ecuador and New Grenada, and are quite identical with each other throughout, and in my opinion different specifically from the species of Central America and Mexico, though about the same size.

Large, entirely black, the upper parts having a fine bronzed yellowish and greenish lustre, becoming violet on the rump and upper tail coverts. Bill very strong and wide at base, curved in its upper outline, pointed, flat above and extended into the frontal plumage, terminating in a semicircle. Plumage of the neck rather full and long, and partially erectile. Wing long, pointed, first quill longest, tail moderate or rather long, rounded, feet and legs strong, claws sharp.

Total length about 14 to 16 inches, wing 7 to 8, tail 6 to 6½ inches (adult).

Hab.—Brazil, Ecuador. Probably inhabits nearly all of South America. Spec. in Mus. Acad., Philada., and Smiths. Mus., Washington.

Easily distinguished from the species immediately succeeding (*C. Mexicanus*) by the bronzed and yellowish lustre of the upper parts in the adult, which is always present but varies much in extent (in the adult plumage only). The entire head is fine blue, and the under parts have a yellowish violet lustre; wings and tail purplish black. The bronzed lustre of the upper parts varies according to age or stage of plumage, and is frequently restricted to a wide transverse band across the upper part of the back and neck behind, and is totally wanting in the young bird. The entire plumage in this species has fine brilliant lustres, as herein described, except the wings and tail, which are rich purplish black.

The young in this species has the bill always thick and strong, though not so long as in the adult. The entire plumage (in the young) is brownish black, frequently with the tips and edges of feathers showing some lustre. Total length of young usually about 12 inches. The two descriptions of Mr. Swainson, cited above, I regard as very probably those of the adult and young of this species.

2. CASSIDIX MEXICANUS, Lesson.

Cassidix mexicanus, Less. Traite d'Orn. i. p. 433 (1831.)

"Corvus mexicanus, Gm." Less. ut sup.

Corvus mexicanus, Gm. Syst. Nat. i. p. 375?

This is apparently an abundant species of Mexico and Central America. Specimens in the Smithsonian Museum, from Mexico and Guatemala, and in Mr. Lawrence's collection from Panama. It is easily distinguished, in adult plumage, from the preceding by its fine violet purple lustre, nearly uniform on the upper and under parts ef the body (not bronzed yellowish and greenish, as in the preceding, *C. ater*).

Large, entirely black, with a fine violet purple lustre on the body above and below; head bluish violet; wings and tail fine purplish or greenish black. Bill very strong, thick, curved in its upper outline, pointed, flat above and extended into the frontal plumage, ending in a semicircle; wing long, pointed, with the second quill slightly longest; tail rather long, rounded; feet and legs strong; claws curved, sharp. Total length 14 to 15 inches, wing 7½ to 8, tail 6 to 6½ inches.

Young. Bill thick and strong as in the adult, but shorter; entire plumage dull brownish black, or with feathers edged and tipped with the lustres of the adult. Total length usually 12 or 13 inches.

About the same size or slightly smaller than the preceding, with the legs and feet rather stronger. Easily distinguished in adult plumage, but the two species are very similar and scarcely distinguishable in young plumage, both being nearly uniform brownish black. This is very probably the species named by Lesson, as above, but whether it is the *Corvus mexicanus*, Gmelin, may be difficult to determine.

Hab.—Mexico, Central America. Spec. in Mus. Acad., Philada., and Mus. Smiths. Inst., Washington.

3. CASSIDIX ORYZIVORUS (Gmelin).

Oriolus oryzivorus, Gm. Syst. Nat. i. p. 386 (1788).

The Rice Oriole, Lath. Gen. Syn. i. p. 423.

Gray Gen. ii. pl. 84?

This is a species much smaller than either of the preceding, and is, perhaps, that figured by Mr. George Robert Gray in his great work, "The Genera of Birds," as bove cited. For the purpose of more fully understanding this species, I copy the original description of Latham, on the faith of which, only, Gmelin gave the name:—

"Length *nine inches*. Bill an inch and a half long, black, stout, sharp, a very little bent at the tip; flat on the top towards the base, where it is round-

ed, and passes far back on the forehead, and is there a little protuberant like the former ones: the general color of the plumage is black; the head, neck and breast have a fine purple gloss; the whole wing, and rest of the body, black; the tail consists of twelve feathers, and was five inches in length, *but had been longer*, as the ends were spoiled; the wings reached a little beyond the insertion of the tail; the legs were wanting."

"I found this species in the collection of Miss Blomefield; it was supposed to come from Cayenne. A label annexed gave it the name of *Oiseau de Ris de grosse espece.*"

At present I have seen, in adult plumage, no specimen small enough to be properly or without misgiving regarded as the species described by Latham, nor do I quite understand the "protuberant" character of the bill as stated by him. Further, in all specimens that I have seen the wings reach so far beyond the insertion of the tail that his description in that particular is by no means applicable, and on the whole I am not without suspicion that this description is not of a bird of the genus *Cassidix* at all. This description is the sole foundation of the species, if such it is, and the name, as given by Gmelin on the faith of it, has been applied by nearly all late authors, evidently on the supposition that there is one species only extant, which supposition I regard as erroneous, and as probably so, the application of this name.

At present (assuming that this may be a species of *Cassidix*), two specimens now before me, it is possible to refer to it, and so also is the bird figured by Mr. Gray, as above. The two specimens before me are in young plumage, and are the smallest of this genus that I have ever seen. The bill is smaller and more slender than in either of the preceding, especially the upper mandible. One specimen from the collection of my friend Mr. Lawrence, of New York, is adolescent, the plumage on the body showing some edgings of purple lustre, nearly uniform above and below. This specimen is from Brazil; the other specimen is in the Acad. Mus., and without label, stating locality. It is nearly uniform brownish black, as in young birds of other species of this genus, but with numerous traces of bluish purple lustre.

Mr. Gray's figure, which I regard as probably representing the nearly adult of the same species as the two young birds here mentioned, is that of a bird about 10½ inches in total length, of nearly uniform bluish purple color. The young bird in the Acad. Mus. measures, total length 10 inches, wing 6, tail 4¼ inches.

4. CASSIDIX VIEILLOTI (Bonaparte).

Scaphidurus Vieilloti, Bonap. Consp. Av. i. p. 426 (1850).

In the very extensive and valuable collection of birds of Central and South America now belonging to the Smithsonian Institution, I find one specimen, which, though in young plumage, may be different from either of the species above mentioned. It is labelled, in the handwriting of Mr. Jules Verreaux, "*Scaphidurus Vieilloti*, Bonap.," and the conclusion of that most accurate and excellent ornithologist is always entitled to great respect and consideration. The following is Bonaparte's diagnosis:—

"Sc. Vieilloti, Bp. (Cassicus niger? Vieill.) Gal. Ois. t. 89? ex Cayenna, Antillis. Mus. Darmstadt. *Statura media, remigibus primis quatuor apice emarginato dilitatis.*"

This specimen is in young plumage, being nearly uniform brownish black, the bill slender, comparatively, and more narrow above than in any other I have seen. The primaries are wide, but not especially so at their ends, and have a slight emarginate character at their tips. Total length about 11½ inches, wing 5½, tail 4½ inches. "Young male."

At present I regard this as the fourth species of *Cassidix* with which I am acquainted.

The Annual Reports of the Librarian and Curators were read, as follows:

REPORT OF THE LIBRARIAN.

The Librarian most respectfully reports that the number of donations to the Library from January to December, 1866, inclusive, is 1603.

Of these there were volumes	499
pamphlets	1102
maps	2
Total	1603

As follows:

Folios	16
Quartos	402
Octavos	1158
Duodecimos	25
Maps	2
Total	1603

These were derived from the following sources:

Authors	105	Surgeon General, U. S. Army	1
Editors	132	S. S. Haldeman	4
Societies	488	Chas. H. Hart	1
Library Fund	318	Hon. Secretary of the Navy	1
Executors of Dr. Wilson	98	F. Leypoldt	1
Edw. Wilson	175	Wm. M. Gabb	1
Rathmell Wilson	235	J. E. Gray, M. D	1
Publishers	8	Geological Survey of India	5
Isaac Lea	7	Chas. E. Smith	1
Dr. Leidy	4	War Department, U. S. Army	1
Minister of Public Works, France	4		
Wm. S. Vaux	11	Total	1603
United States Congress	1		

And were divided as follows:

Anatomy and Physiology	34	Icthyology	11
Antiquities	1	Journals	1046
Bibliography	13	Mineralogy	6
Biography	2	Ornithology	100
Botany	31	Physical Science	10
Chemistry	5	Mammalogy	5
Conchology	73	Maps	2
Entomology	51	Religion	1
General Natural History	83	Voyages and Travels	15
Geology	91		
Helminthology	7	Total	1603
Herpetology	16		

All of which is most respectfully submitted by

J. D. SERGEANT,
Librarian.

REPORT OF THE CURATORS,

For 1866.

The Curators, in presenting their Annual Report, take the opportunity of expressing their satisfaction and pleasure in the prospect that their suggestion of the last Report, in relation to an increase of accommodations for the overcrowded Museum and Library, is likely to be carried out. The success of the

Committee on the Building Fund, created for the purpose of obtaining means for the purchase of a suitable lot of ground and the erection of a new and larger Hall for the Academy, should encourage us to renewed efforts to secure the most ample means for the objects of the Institution.

The Curators further take pleasure in announcing to the Academy that the Museum, committed to their charge, is in a far better condition of preservation than in the previous years. The liberal appropriations made by the Academy, of which only three-fourths were expended, through the exertion of our associate, Mr. Cassin, has enabled us thoroughly to disinfect and put in good order our magnificent collection in ornithology.

Without expense to the Academy, under our direction and through the aid of several members, students operating under the Jessup Beneficiary Fund, the American Herbarium has not only been renovated, but all the plants have been poisoned so as to secure them from future depredation, and now the same process is being carried on with the General Herbarium. Through similar aid, we have been enabled to put the Entomological Cabinet in good order. All other portions of the Museum are in an excellent state of preservation.

The following account exhibits the contributions to the Museum of the Academy in its various departments during the year:

Mammals and Birds.—Eight specimens of the former were presented by Mrs. Mary Brainerd, C. J. Wood, A. H. Smith and Drs. J. F. Meigs and W. Camac.

One hundred and sixty-five specimens of 90 species of birds, chiefly from Western America and the West Indies, were presented by the Smithsonian Institution. Fifty-three specimens of 31 species were presented by Dr. H. B. Butcher; and 28 specimens, mainly in young plumage, by C. J. Wood. Seventy-three specimens were presented by W. S. Vaux, E. D. Cope, J. Leidy, J. F. Cavada, Dr. E. Coues, C. S. Westcott, Jos. Jeanes, R. Bridges, J. G. Bell, T. Julius, E. P. Borden, and Dr. W. A. B. Norcom.

Reptiles and Fishes.—Twenty-three specimens of the former, and 18 of the latter were presented by Dr. Lemuel J. Deal, S. Powel, Miss Sallie Bridges, E. Diffenbaugh, W. C. Henszey, and R. J. Hardie. Small collections of both were also presented by Dr. Slack, and Mr. Hoopes.

Mollusks.—Thirteen hundred species of shells, of which 793 were new to our Museum, were presented by the Smithsonian Institution. Mr. Tryon presented 84 species of shells, in addition to a small collection. Dr. C. J. Cleborne presented a collection of 140 species. Ninety-five species, in addition to several small collections, were also presented by Rev. E. R. Beadle, John B. Eshleman, T. A. Conrad, I. Lea, J. H. Thompson, Dr. LeConte, C. F. Parker, Miss Bridges, Col. Jas. Greer, Patricio Paz, E. Gaussoin, Dr. E. Michener, S. Powel, and Dr. Ruschenberger.

Articulates.—James H. B. Bland presented 207 specimens of 130 species of Coleoptera. Eighty-eight species of insects were presented by Geo. A. Propper, and 41 specimens of 35 species by Dr. H. B. Butcher. A few insects, crustaceans and worms, were also presented by Tryon Reakirt, Dr. C. J. Cleborne, C. M. Wheatley, Geo. W. Tryon, Jr., R. A. Parrish, Jr., Dr. LeConte, K. K. Womrath, W. McConnell, and S. Powel.

Radiates.—Of these, fourteen were presented by Dr. C. J. Cleborne, W. M. Gabb, George W. Tryon, Jr., and Miss Bridges.

Fossils.—A collection of fossil fishes from the cretaceous formation of the Upper Missouri was presented by George A. Propper. Sixty-four specimens of fossils, together with several small collections, were presented by Dr. Geo. H. Horn, Dr. A. C. Hamlin, W. A. Hendry, Col. James Greer, D. C. Collyer, E. D. Cope, F. Ashurst, C. C. Abbott, Dr. W. Spillman, John Hanson, Mr. Da Costa, W. B. Haseltine, J. Jeanes, Col Jas. J. Conner, J. F. Clew, O. Biddle, E. Gaussoin, Dr. F. Poey, C. S. Westcott, W. Struthers, W. L. Cassin, and W. N. Allen.

Minerals.—Mr. Lea presented a fine crystal of Phlogopite, weighing 23 pounds, in addition to 19 other minerals. Fifty specimens were presented by Dr. I. I. Hayes, T. D. Rand, Dr. A. C. Hamlin, Dr. F. V. Hayden, Mrs. J. F. Watson,

Geo. Lewis, T. G. Smith, E. Gaussoin, J. C. Trautwine, W. W. Jefferis, Dr. Ruschenberger, Mr. Godshall, M. A. Root, J. F. Clew, D. C. Collier, W. H. Stephens, W. L. Cassin, W. C. M. Jones, and J. M. Watson.

Botany.—A collection of plants of the Wilkes' Exploring Expedition was presented by the Smithsonian Institution. Dr. A. W. Chapman presented a collection of plants from Florida. The subscribers of the Library Fund presented a copy of Sullivant and Lesquereux' Musci Boreali-Americana. Mr. E. Diffenbaugh presented a collection of 83 species of plants. Mrs. M. A. Bush presented a collection of 95 marine algæ. One hundred and twelve species of Californian and Rocky Mountain plants were purchased by the Academy.

Comparative Anatomy.—Two skulls were presented by Dr. Leidy and Col. A. W. Putnam, and the skeleton of a snake was deposited by the Am. Philos. Society.

The Museum of the Academy has been open, as usual, for the gratuitous admission of the public, two days in every week, except during the months of April, May and June, when, by direction of the Academy, the Museum was open five days per week. The number of visitors during the year was 34,521, not including those introduced personally by members, or admitted on other than the public days, of which it is quite impossible to keep an account.

Respectfully submitted by
JOSEPH LEIDY,
Chairman of the Curators.

The election of officers for the ensuing year was held in accordance with the By-Laws, with the following result:

President	ISAAC HAYS, M. D.
Vice-Presidents	Wm. S. Vaux,
	John Cassin.
Corresponding Secretary	Joseph Jeanes.
Recording Secretary	H. C. Wood, Jr., M. D.
Treasurer	W. C. Henszey.
Librarian	J. D. Sergeant.
Curators	Joseph Leidy, M. D.,
	Wm. S. Vaux,
	John Cassin,
	E. D. Cope.
Auditors	Joseph Jeanes,
	Aubrey H. Smith,
	Wm. S. Vaux.
Publication Committee	Robert Bridges, M. D.,
	Wm. S. Vaux,
	John Cassin,
	Joseph Leidy, M. D.,
	Geo. W. Tryon, Jr.

The following were elected members:

Hugh Davids, Eben C. Jayne, George Vaux, Joshua T. Jeanes, Coleman Sellers and George S. Schively, M. D.

The following were elected Correspondents:

C. C. Gray, M. D., U. S. A.; J. J. Wisely, M. D., U. S. A.; E. L. Berthoud, Civ. Eng., Boulder City, Colorado Terr.; Charles Elton Buck, Chemist, New York; and J. M. S. Thackara, of Puno, Peru.

[Dec.

ELECTIONS FOR 1866.

The following persons were elected Members,—viz.:

Jan. 30.—Robt. Frazer, Wm. F Jones, Edw. L. Reakirt, Rev. E. R. Beadle, Geo. W. Childs, Jas. H. B. Bland, Geo. M. Woodward, Thos. Guilford Smith.

Feb 27.—Wm. R. White, John E. Graeff, Wm. Evans, Jr., Edw. R. Wood, Philip C. Garrett, Chas. Hartshorne.

March 27.—Chas. S. Wescott, Thos. C. Stellwagen, M. D., Alfonso DeFiganiere, Wm. C. Keehmle, Samuel E. Slaymaker, John Turner, Chas. B. Durburrow, R. Shelton Mackenzie, D. C. L., Clemmons Hunt, Jas. C. Parrish, Amos R. Little, J. A. Heintzelman.

April 24.—John B. Parker, Joseph Thomas, M. D., Josiah Hoopes, Chas. S. Lewis, Tryon Reakirt, Edw. K. Tryon, Jr., Rev. Geo. D. Boardman, Lemuel J. Deal, M. D., R. S. Weber, M. D., Samuel R. Shipley, Wm. Sellers, Joseph Walton.

May 29.—Jos. R. Rhoads, Wm. K. Gilbert, M. D., Samuel Huston, S. Clarkson Taylor, Robt. S. Kenderdine, M. D., Daniel Haddock, Jr., Henry A. Dreer, Christian C. Febeger, Henry Stillé, M. D.

June 26.—Lieut. Henry Carpenter, Brevet Major U. S. A., Geo. Guier, M. D., of Costa Rica, Cent. Am., Henry B. Butcher, M. D., Jason L. Fenimore, S. Raymond Roberts.

July 31.—Geo. H. Horn, M. D., John G. Moore, Andrew Nebinger, M. D., Chas. G. Ogden, Samuel L. Shober.

Aug. 28.—Gen. S. Wylie Crawford, U. S. A.

Sept. 25.—E. B. Vandyke, M. D., Frank H. Wyeth.

Oct. 30.—Wm. Mayburry, M. D., W. C. Dixon, M. D.

Dec. 11.—Jos. C. Turnpenny, Maj. A. R. Calhoun, Albert R. Leeds, John Ford, Edwin J. Houston, Wm. S. Grant.

Dec. 26.—Hugh Davids, Eben C. Jayne, George Vaux, Joshua T. Jeanes, Coleman Sellers, George S. Schively, M. D.

The following were elected Correspondents,—viz.:

Feb. 27.—Geo. W. Clinton, of Buffalo, N. Y.

March 27.—Robt. Gray, of Glasgow, Wm. Sinclair, of Glasgow, Rev. Jos. Blake, of Gilmanton, N. H.; D. C. Collier, of Central City, Cal.

April 24.—Dr. Hermann Credner, Jacob Stauffer, of Lancaster, Pa.; Prof. Alfred Du Bois, of Laurette, Park Co., Col.; J. H. Baxter, M. D., U. S. A., Washington, D. C.

May 29.—Rev. W. B. Anderson, of Rochester, N. Y.; Samuel R. Carter, of Paris Hill, Oxford Co., Me.

June 26.—Geo. A. Otis, M. D., Wm. H. French, of White Haven, Luzerne Co., Pa.; M. Le Marquis de Caligny, France.

July 31.—Frank Cowan, of Washington, D. C.

Sept. 25.—Gabriel E. Manegault, of Charleston, S. C.

Dec. 26.—Dr. C. C. Gray, U. S. A., of Fort Randall, Dakota, Ter.; Dr. J. J. Wisely, U. S. A., of Fort Dakota, Dakota Ter.; E. L. Berthoud, of Boulder City, Col. Ter.; Chas. Elton Buck, of New York; J. M. S. Thackara, of Puno, Peru.

CORRESPONDENCE OF THE ACADEMY,

For 1866.

Letters were received and read as follows:

January 9th.—Albany Institute; Linnean Society; Imperial Society of Moscow; L. H. Morgan.

January 16th.—Lieut. Gen. U. S. Grant, Jan. 15th, and Maj. Gen. George G. Meade, Jan. 17th, acknowledging the receipt of diplomas of membership.

January 23d.—Royal Society of Sciences, Upsala, Oct. 1st, 1865, acknowledging the receipt of the Journal and Proceedings, and accompanying donations to the Library.

Royal Academy of Sciences, Turin, Aug. 11th, 1863;

Royal Lombardy Institute of Sciences, Milan, Feb. 6th, 1863;

Natural History Society of the Osterlandes at Altenburg, Sept. 1st, 1865;

Imperial Royal Geological Society of Vienna, Sept. 22d, 1865; all acknowledging receipt of the Proceedings.

Bohemian Society of Sciences, Prague, May 28th, 1864;

Imperial Academy of Sciences, Vienna, Sept. 23d, 1865;

Senckenberg Natural History Society, Frankfort on the Prague, Aug. 10th, 1865;

Upper Hesse Society of Natural and Medical Sciences, Giessen, Aug. 25th, 1865;

Society of Geology and Associated Sciences, Jan. 27th, 1865;

Natural History Society of Mannheim, Sept. 6th, 1865; all accompanying donations to the Library.

January 30th.—R Wilson, Esq., in regard to a legacy left the Academy by his brother, Dr. T. B. Wilson.

February 6th.—Prof. Durieu, Bordeaux, Aug. 18th, acknowledging election as correspondent.

Boston Society of Natural History, two letters dated respectively May 1st, 1864, and Aug. 23d, 1866, acknowledging the receipt of the Proceedings.

Medico-Natural History Society of Jena, accompanying donations to the Library, May 6th, 1865.

February 13th.—Charles J. Wister, Esq., accompanying donation of photograph of Mr. I. Lukens.

March 6th.—Royal Library of Munich;

Natural History Society of Freibourg;

Physico-Medical Society of Wurzburg;

Natural History Society of Brunn;

Isis of Dresden;

Royal Academy of Sciences, Letters, and Fine Arts, Brussels;

Royal Academy of Sciences, Amsterdam;

Society of Natural Sciences, Gallen, Switzerland;

Natural History Society of Augsburg;

Royal Meteorological Society of the Low Country, Utrecht;
Royal Academy of Sciences, Amsterdam;
Royal Swedish Academy of Sciences, Stockholm; all accompanying donations to the Library, and acknowledging receipt of Proceedings.
G. W. Clinton, Esq., Buffalo, March 3d, acknowledging election as correspondent.
Imperial School of Mines, Paris, and
Bavarian Academy of Sciences, desiring supply of deficiencies.

March 13th.—President of the Pennsylvania Horticultural Society, in regard to Penn Square.

April 3d.—Smithsonian Institution, March 20th, acknowledging receipt of Proceedings; also from
Royal Academy of Sciences of Lisbon, dated Dec. 26th, 1865, accompanying donations to the Library.

May 1st.—Utrecht Society of Arts and Sciences, Sept. 19th, 1865;
Bureau of Geological Investigations in Sweden, Stockholm, Nov. 6th and 10th, 1865; severally acknowledging receipt of Proceedings.
Imperial Leopold German Academy of Sciences, Dresden, Jan. 25th, 1866;
Royal Society of Sciences of Leipsic, Sept. 30th, 1865, accompanying donations to the Library.
Society of Natural Sciences, Luxembourg, Oct. 30th, 1865;
Zoological Society of Frankfort, Jan., 1866;
Imperial Society of Sciences, Gottingen, Jan. 31st, 1866; acknowledging receipt of Proceedings and accompanying donations to the Library.
Royal Society of Edinburg, Nov. 1st, 1866, asking for a supply of deficiencies.
Society of Natural Sciences of Basle, Feb. 1st, 1866, concerning deficiencies, and accompanying donations to the Library.
Mr. Winslow, of Munich, March 24th, 1866, in relation to ethnological casts.
Isaac Lea, LL. D., and G. W. Tryon, Jr., Esq., with regard to specimens presented by them to the Academy.

May 15th.—A. W. Chapman, Apalachicola, April 28th, 1866;
J. H. Baxter, Washington, May 7th, 1866;
Herman Credner, New York, May 4th, 1866;
Jacob Stauffer, Lancaster, Pa., May 7th, 1866; acknowledging election as corrrespondents.

June 5th.—Robert Grey, Glasgow, May 12th, 1866, acknowledging receipt of notice of his election as a correspondent.
Naturforschenden Gesellschaft, Berlin, acknowledging receipt of Proceedings, and announcing that their publications had been sent in return.

July 3d.—American Antiquarian Society, Worcester, Mass., June 11th, 1866;
Senkenberg Natural History Society, Frankfort on the Main, March 15th, 1866;
Natural History Society of Danzig, Sept. 29th, 1865; severally acknowledging receipt of the Proceedings of the Academy.
Royal Prussian Academy of Sciences, Berlin, Sept. 24th, 1865;
Senkenberg Natural History Society, Frankfort on the Main, March 15th, 1866; severally accompanying donations to the Library.
Joseph Blake, Esq., Gilmanton, N. H., Jan. 4th, 1866;
M. B. Anderson, Rochester, N. Y., June 10th, 1866;
Samuel R. Carter, Paris Hill, Maine, June 4th, 1866; severally acknowledging election as correspondents.
Wm. H. Dall, San Francisco, June 10th, 1866, in reference to the operations of the Behring's Straits' Expedition, Scientific Corps.
Alfred Du Bois, Buckskin, Colorado, June 12th, 1866, acknowledging election as correspondent, and asking for information as regards contributions.
A. S. Christine, Principal of Carbon Academy, Lehighton, Pa., asking donations of objects of Natural History.
Dr. B. A. Gould, asking information concerning certain instruments in making physiological researches into the physical history of man.

July 10th.—George A. Otis, Assist. Surg. U. S. A., acknowledging the receipt of notice of his election as correspondent.

July 24th.—Helvetian Natural History Society of Berne, Dec., 1865;
Royal Asiatic Society, London, April, 1866; each acknowledging the receipt of the Proceedings.
Natural History Society of Prussian Rineland and Westphalia, Bonn, March 1st, 1866, accompanying donations to the Library, and acknowledging the receipt of the Proceedings.
Directory of the Society of Geology and Associated Sciences, Darmstadt, Feb. 6th, 1866;
Mineralogical Society of Petersburg, Dec. 20th, 1866;
University of Lund, Sweden, Nov., 1865;
Imperial Academy of Sciences, Vienna, April 9th, 1866; severally accompanying donations to the Library; that from the University of Lund also asking for exchanges.
Geological Society of India, Calcutta, Dec. 14th, 1865, asking exchanges, and accompanying donation to the Library.
Natural History Society of Berne, 1866; accompanying donations to the Library.
Royal Gymnasium and High School, Pölten, in Lower Austria, April 26th, 1866, asking supply of deficiencies in their publications of the Academy.
Felix Flügel, Leipsic, 1866, in regard to duplicates of the Proceedings of the Academy.
Zoological and Mineralogical Society of Regensburg, asking supply of deficiencies in their publications of the Academy.

August 14th.—A. Ramond de Corbineau, July 2d, 1866; and
Marquis de Caligny, Cherbourg, France, 1866; each acknowledging election as correspondent.
M. McDonald, Professor of Geology in Military Institute of Virginia.

September 11th.—British Museum, July 30th, 1866, acknowledging receipt of Nos. 1—5 Proceedings, 1865.
Dr. L. M. Pendleton, Belfast, Maine, Aug. 13th, 1866, giving information of the sale of the skin and skeleton of an elephant.
Dr. Jos. Szabo, Pest, Hungary, July 31st, 1866, announcing donation on part of the Society of Pest of a fragment of a meteorite which fell in the north east of Hungary June 9th, 1866.
Société des Sciences Naturelles de Neuchatel, Switzerland, Nov. 23d, 1865, acknowledging receipt of Proceedings, Nos. 1—7, 1863, 1—5, 1864, and Journal, vol. v. pt. iv.
American Antiquarian Society of Worcester, Mass., Aug. 23d, 1866, acknowledging receipt of Proceedings.

October 2d.—Natural History Society of Basle, Sept. 15th, 1866;
Batavian Society of Sciences, Rotterdam, Oct. 21st, 1865;
Royal Library of Dresden, Dec. 11th, 1865;
Royal Imperial Zoological Botanical Society of Vienna, Jan., 1866;
German Geological Society, Berlin, Nov. 4th, 1865;
Society of Natural Sciences, Leipzig, Nov. 20th, 1865;
Linnean Society, London, July 28th, 1866;
Royal Saxon Society of Sciences, Leipzig, Nov. 30, 1865;
Society of Natural Sciences, Weisbaden, Oct. 10th, 1865;
Society of the Friends of Natural History, Mecklenberg, Oct., 1864; severally acknowledging receipt of Proceedings.
Boston Society of Natural History, Sept. 17th, 1866;
Geological Survey of India, May 11th, 1865;
Linnean Society of Bordeaux, June 8th, 1866; severally accompanying donations to the Library.
Provincial Secretary's Office, Ottawa, Aug. 31st, 1866, accompanying dona-

tions on the part of the Government of Canada of the Atlas, &c., of the Geological Survey.

Imperial Academy of Sciences, Vienna, June 30th, 1866, in reply to letter in relation to deficiencies.

Geographical Society of Dresden, May 16th, 1866, accompanying donations to the Library, and asking exchange.

Upper Hessian Society of Natural and Medical Sciences, acknowledging receipt of Proceedings, and directing mode of transmission.

October 9th.—Prof. Alfred Newton, of Magdalen College, England, acknowledging election as correspondent.

October 16th.—Frank Cowan, Esq., Greensburg, Pa., Oct. 11th, 1866, acknowledging election as correspondent.

October 23d.—Gabriel E. Manegault, acknowledging election as correspondent.

November 20th.—Royal Prussian Academy of Sciences, Berlin, March 15, 1866;

J. H. Baxter, War Department, Washington, Nov. 15th, 1866; severally accompanying donations to the Library.

American Antiquarian Society, acknowledging receipt of Proceedings.

Smithsonian Institution, acknowleging receipt of Proceedings.

Imperial Mineralogical Society of St. Petersburg, Oct. 24th, 1866, inviting all friends of science to their 50th anniversary.

Society of the Friends of Natural History, Berlin, Feb. 12th, 1866, acknowledging receipt of publications of the Academy.

Zoologico-Mineralogical Society at Regensburg, accompanying donations to Library.

December 4th.—Mrs. M. A. Bush, of Cohoes, N. Y., accompanying her donations of Algæ.

December 18th.—Edinburgh Geological Society, accompanying donations to Library and asking exchange.

Society for the Advancement of the Natural Sciences, Marburg, accompanying donations to Library, and acknowledging receipt of the Proceedings.

Royal Meteorological Institute, Utrecht, accompanying donations to Library.

Literary and Philosophical Society of Manchester;

Catholic University of Louvain; severally accompanying donations to Library and asking supply of deficiencies.

Royal Public Library of Dresden;

Natural History Society of Basle;

Geological Society of Darmstadt;

Royal Society of Amsterdam; severally acknowledging receipt of Proceedings.

DONATIONS TO THE MUSEUM.

1866.

Abbot, C. C. *Oct.* 16*th.* Tooth of Carcharodon and Lamna. Trenton Falls, N. J.

Allen, W. A. *Dec.* 11*th.* Vertebra of a Crocodile and bones of a Turtle.

American Philosophical Society. *June* 5*th.* Skeleton of the Rattlesnake.

Ashhurst, Francis. *Oct.* 16*th.* Fossil vertebra of a Shark and tooth of a Crocodile, from the Green Sand of Pemberton, N. J. *Nov.* 13*th.* Four vertebræ of a Crocodile, from the Green Sand of Pemberton, N. J.

Beadle, Rev. E. R. *Nov.* 20*th.* Twenty-two species of Shells. *Dec.* 11*th.* Retrorsa, Gould and Cyclophorus pernobilis, Gould, from Tavoy, Burmah.

Bell, John G. *Jan.* 2*d.* Cultrides rufipennis, G. R. Gray, from South America.

Biddle, Owen. *April* 10*th.* Fossil Wood.

Bland, Jas. H. B. *March* 6*th.* Eighty-one specimens, 54 species of Coleoptera, mostly new to the Museum. *June* 5*th.* 126 specimens, 76 species, Coleoptera, from the vicinity of Philadelphia.

Borden, E. P. *Dec.* 11*th.* Specimen of Buteo lineatus, the red-shouldered Hawk, Delaware County, Pa.

Brainerd, Mary. *Oct.* 9*th.* Mounted specimen of the Northern Lynx, from Jefferson Co., N. Y.

Bridges, Sallie. *May* 8*th.* An Echinus, Loligo and 3 Reptiles, Santa Cruz.

Bridges, Dr. Robert. *Aug.* 21*st.* Two Phonipara canora, male and female, from Cuba.

Burke, Isaac and Jesse T. *May* 1*st.* Bryttus chætodon.

Bush, Mrs. M. A., of Cohoes, Albany Co. *Dec.* 4*th.* 95 specimens of marine Algæ.

Butcher, Dr. H. B. *Jan.* 23*d.* A collection of Birds, consisting of 31 species, 53 specimens, from Virginia and the District of Columbia, and a collection of Insects, about 35 species, 41 specimens, from the same location.

Camac, Dr. Wm. *April* 10*th.* A mounted specimen of Geomys bursarius, Wisconsin.

Campbell, Chas. B. *Nov.* 20. Very fine Albino Rat from Philadelphia,

Cassin, William L. *Dec.* 11*th.* A collection of Fossils and a collection of Quartz Crystals, from the Delaware Water Gap, Monroe Co., Pa.

Cavada, J. F. *June* 5*th.* Ortyx Cubanensis, male and female, from Cuba.

Chapman, A. W., M. D. *Aug.* 7*th.* A large collection of Plants, from Florida.

Cleborne, Dr. C. J. *Dec.* 11*th.* 140 species of Shells, from various localities, among which are fine specimens of rare and valuable species. Seven specimens of Radiata. Two specimens of Tarantula, from Martinique, West Indies.

Clew, J. H. *May* 29*th.* Two large masses of Rock Salt, from the Island of Petite Anse, Louisiana. *July* 10*th.* A small collection of fossil bones of an Elephant, from Island Petite Anse, La. *Oct.* 16*th.* Fragments of Elephant bones, from the Salt Mines of Petite Anse, La.

Collier, D. C. *Jan.* 9*th.* Collection of Fossils, from Smoky Hill River, Col-

orado Territory. *Aug.* 14*th.* Specimens of Chalk, from bluffs, 75 feet high, on Smoky Hill River, eastern boundary of Colorado Territory.

Conner, Col. Jas. J. *June* 5*th.* Large mass of white ash anthracite Coal, with distinct impressions of Sigillaria, from Schuylkill Co., Pa.

Conrad, T. A. *Nov.* 13*th.* Ten species of Shells (types). *Nov.* 20*th.* One species of Shell.

Cope, E. D. *Jan.* 23*d.* Fossil Teredo and Nautilus, from Glassboro, N. J. *June* 12*th.* Silicified Wood, Glassboro, N. J. *Dec.* 11*th.* Twenty specimens of Birds, from Jalapa, Mexico.

Coues, Elliot, M. D. *June* 5*th.* Ægialitis nivosus, Dendroica Graceæ, from Arizona.

Da Costa, J. *Oct.* 2*d.* Four teeth of Carcharodon and Otodus, from near Fort Laramie.

Deal, Dr. Lemuel J. *April* 3*d.* 18 specimens, 8 species, of Serpents from Louisiana.

Diffenbaugh, E. *May* 1*st.* Bryttus chætodon, Bristol, Pa. *Oct.* 16*th.* 83 species of rare Plants, from Pennsylvania and New Jersey.

Eshleman, John B. *Dec.* 11*th.* Suite of Shells, 30 species, from Lancaster Co., Penna.

Gabb, W. M. *March* 6*th.* Three Corals, from California. *June* 12*th.* Large Egg, from California, and Sponge, from Japan. *July* 10*th.* Specimens of Virgularia elongata.

Gaussoin, Eugene, through Dr. Hayden. *May* 1*st.* Three fossil Corals and a Shell, from Navassa, W. I. *June* 19*th.* A collection of Oolitic Phosphates of Lime, Coral Limestone, Stalactite, and fragments of Indian Pottery, from the Island of Navassa, W. I.

Godshall, Mr. *July* 10*th.* A mass of Quartzose brecia, Valley Forge, Pennsylvania.

Grasses. *Jan.* 2*d.* A collection of 62 species of Grasses, from California. Purchased.

Green, Col. James. *May* 1*st.* Fossil Fish Scales, from the loess of the Mississippi, in the vicinity of Vicksburg. *June* 5*th.* Six species of Helix and one of Succinea, from the loess near Vicksburg, Miss. Also a recent and new species of Succinea, from the same vicinity. A collection of bones and scales of a Fish, from the loess near Vicksburg, Miss. A small collection of Devonian and carboniferous Fossils, from near Pittsburg, Pa.

Hamlin, Dr. A. C. *April* 10*th.* Specimens of Itacolumite and Auriferous Quartz, from Georgia. *May* 22*d.* Sulphuret of Antimony. Carmel, Maine. *June* 5*th.* Some fossil Bones and Shells from a railroad cutting. Maine.

Hardie, Robt. J. *Sept.* 4*th.* Horned Frog, from Texas.

Haseltine, Ward B. *Feb.* 13*th.* Fossil Wood, from Schuylkill Co., Pa.

Hayden, Dr. *Nov.* 6*th.* Specimens of Pipestone and other Minerals, from Dakota Territory.

Hayes, I. I. *Feb.* 13*th.* Fine large crystalline block of Cryolite; smaller specimens of do.; 2 Cryolite with chalybite, galena and sulphuret of iron; Crystallized Quartz, Granite, Fluorspar, Feldspar, and Epidote, from Ivigtut, Greenland.

Hendry, William A., of Halifax. *March* 6*th.* 12 specimens of Coal Plants, from Glace Bay, &c., Nova Scotia.

Henszey, W. C. *June* 5*th.* Diodon, from Atlantic City.

Horn, George H. *June* 12*th.* Fragments of jaws and teeth of a fossil Horse, from Buena Vista Lake, Cal. *July* 10*th.* Enstrongylus gigas, from the Coyote.

Jefferis, Wm. W. *Jan.* 23*d.* A large cleavage crystal of black Biotite, penetrated by a crystal of Apatite. Rossie, St. Lawrence Co., N. Y.

Jeanes, Jos. *Jan.* 2*d.* 4 Muscipeta Du Chailluii, 2 Chloropicus brachyrhynchus, Chloropicus, nivosus, Bradyornis, sp. 1, Nectarinia, sp., from Mr. Du Chaillu's collections in Western Africa. *June* 5*th.* Fossil Shells, Scranton, Luzerne Co.

Jones, W. C. M. and J. W. Watson. *Jan.* 23*d.* Three specimens of Argentiferous Galena, from Baker Lode, Argentine Dist., Colorado.

Julius, Capt. T. *Dec.* 11*th.* Fine specimen of Somateria spectabilis, the King Duck, from Newfoundland.

Lea, Isaac. *Jan.* 23*d.* Emerylite in large cleavage crystals, &c. Unionville, Chester Co. *Feb.* 13*th.* Double terminated crystal of Quartz, 14 inches long, from Jefferson Co., N. Y. *Feb.* 20*th.* Fine large crystal of Phlogopite, from near Rossie, N. Y. This crystal is a hexagonal prism, with oblique cleavage, weighing 23 pounds. *May* 1*st.* Large specimen of Phlogopite, Rossie, N. Y. *May* 8*th.* Large specimen of Crysotile. Blue Hill, Delaware Co., Pa. Eight species of fluviatile Shells. *May* 22*d.* Galena. Ivigtut, Greenland. 14 Minerals, from Del. and Chester Co., Pa., and N. Y. *May* 22*d.* Galena. Ivigtut, Greenland. *Nov.* 13*th.* Five species of Unio. *Nov.* 13*th.* Feldspar, from near Wilmington, Del.

Le Conte, J. L., Dr. *May* 1*st.* Three bottles U. S. Coleoptera, 2 from Honduras; 1 Apus longicaudatus, from Kansas; and a large Entomostracan, from Ohio. Also a bottle of Arseniate of Potassa.

Lee, Peter, Benj. Oman and Daniel Austin, through Mr. Powel. *Jan.* 23*d.* A collection of 15 specimens, 6 species, of Fishes, several marine Worms, Crustacea and Mollusks, from Newport, R. I.

Leidy, Dr. Jos. *Jan.* 2*d.* Skull of a Manatus. *April* 10*th.* Crystallized Epidote, from the vicinity of Germantown. *Dec.* 11*th.* Ten species of Birds, from Jalapa, Mexico.

Lewis, Geo. T. *April* 17*th.* Large specimen of Pachnolite. Ivigtut, Greenland.

McConnell, Wm. *July* 10*th.* A large Spider.

Meehan, Thos., Mr. *Sept.* 11*th.* Specimens of Pinus pungens.

Meigs, J. F., Dr. *Sept.* 18*th.* Specimens of the Jumping Mouse, Jaculus hudsonius.

Michener, Dr. E. *Nov.* 20*th.* One species of Shell.

Norcum, W. A. B. *Sept.* 11*th.* Specimens of Crotophaga ani, shot at Edenton, N. Carolina.

Parker, C. F. *Dec.* 11*th.* Conus capitanus, Linn. A variety new to the Academy collection.

Parrish, R. A., Jr. *July* 10*th.* Luna Moths.

Paz, Signor Patricio. *Feb.* 20*th.* Collection of Mollusca, in alcohol, from South America.

Plants. *Jan.* 23*d.* A collection of 50 species of high Alpine Plants, from the Rocky Mountains. Purchased.

Poey, Dr. Felipe, Cuba. *June* 12*th.* Fossil vertebra of a Crocodile and costal plate of a Turtle, from Cuba.

Propper, Geo. A., through Dr. Hayden, who retains the right of borrowing the specimens. *Nov.* 6*th.* A collection of fossil Fishes, from the cretaceous formation, No. 3, of Yankton, Dakota.

" Through Prof. Hayden. *Nov.* 13*th.* A collection of Insects from Dacota Territory, consisting of 61 specimens of Coleoptera, 4 Orthoptera and 3 Homoptera. Yankton, Dac. Ter.

Putnam, Col A. W. *Jan.* 9*th.* 50 species of rare Plants, from the Rocky Mountains. Purchased.

Rand, Theo. D. *Nov.* 6*th.* Ten specimens of Minerals.

Reakirt, Tryon. *May* 8*th.* Seven specimens of Lepidoptera.

Root, M. A. *March* 20*th.* Specimen of Mecca Oil Rock, from Mecca, Trumbull Co., Ohio.

Ruschenberger, Dr. *May* 1*st.* Specimens of Essonite, Ceylon. *Nov.* 20*th.* One species of Shell.

Slack, Dr. and Mr. Hoopes. *Oct.* 16*th.* A jar of Fishes and Reptiles, two Mammals and a small collection of Shells, from Lake Superior.

Slawsin, John. *March* 20*th.* Mass of fossil Shells, from the Rocky Mountains, in Colorado.

Smith, T. Guilford. *April* 17*th*. Large specimen of Bitter Spar. Chester, Mass.

Smithsonian Institution. *June* 19*th*. A collection of Plants, from the western Coast of South America and the South Pacific Islands, being a portion of the botanical collection of the Wilkes Exploring Expedition. *June* 19*th*. A collection of 148 specimens of Birds, representing 73 species of western North America and the West Indies. *Dec.* 11*th*. Seven specimens of Birds from the West Indies and South America. *Aug.* 21*st*. Six specimens of Birds from Costa Rica and 4 specimens from Jamaica. A large collection of Shells, embracing over 1300 species, of which 793 species are new to the Museum; an extraordinary increase, due in a great measure to many of them being species from the Wilkes Exploring Expedition not previously distributed, while others are new species from Western America, recently described by Mr. P. P. Carpenter, Smithsonian Institution.

Spillman, Dr. W., of Columbus, Mississippi. *March* 20*th*. Fossil phalanx of a large Reptile and 2 segments of a fossil Nautilus. *May* 1*st*. Two Coal fossils. Western Alabama.

Stephens, Wm. H. *July* 24*th*. A large specimen of black Oxyde of Copper, from Lake Superior.

Struthers, W. *July* 10*th*. Two Coal fossils, from Dorchester, New Brunswick.

Subscribers to the Library Fund. *Oct.* 9*th*. Musci Boreali Americana quorum specimina exsiccata W. S. Sullivant et L. Lesquereux ediderunt. Ed. 2d, 1865.

Thompson, John H. *Nov.* 20*th*. Nine species of Shells.

Thompson, John, of New Bedford, Mass. *May* 1*st*. A marine Alga, from Cape Horn.

Trautwine, J. C. *April* 10*th*. Pachnolite, from Greenland.

Tryon, Geo. W., Jr. *May* 1*st*. 20 species land and fresh water Shells. On condition not to be loaned. *May* 8*th*. Fine species of Indian Mollusca. *May* 22d. Ten species of Shells from Cambodia. *Nov.* 13*th*. 18 species of Unionidæ. *Nov.* 20*th*. Seven species of Shells. *Dec.* 11*th*. 24 species of terrestrial Mollusca. New to the Academy's collection.

Unknown donor, through Mr. Tryon. *Jan.* 23*d*. Three species of Crustaceans, a Star Fish, and a small collection of Shells.

Vaux, William S. *Dec.* 11*th*. 20 specimens of Birds, from Jalapa, Mexico.

Vogel, Charles. *Nov.* 20*th*. A brook Trout, caught in the Schuylkill River.

Watson, Mrs. J. Framton. *Nov.* 13*th*. Manganite, Ihlfeldt, Hartz, Marcasite and a fine Mocha Stone.

Westcott, Charles S. *June* 19*th*. Very fine mounted specimens of Aix sponsa, the Summer Duck, and Ortyx Virginianus, the American Partridge; also a Silurian fossil. *Dec.* 11*th*. Fine specimen of Icterus Jamacaii.

Wheatley, C. M. *May* 1*st*. A collection of small Crustaceæ, &c., from Cape St. Lucas.

Wood, Christopher J. *Aug.* 14*th*. One Mus decumanus (pied variety), 1 Arvicola and 19 specimens of Birds of Philadelphia, in young plumage. *Nov.* 13*th*. Two Amazilia Riefferii ♂ ♀, 1 Cyanomyia Cyanocephala, from Belize, Honduras, and six specimens of young Birds, from vicinity of Philadelphia.

Woodward, G. M. *April* 17*th*. A living Iguanian. Navassa, West Indies.

Womrath, F. K. Mantis, from vicinity of Baltimore.

DONATIONS TO THE LIBRARY.

1866.

JOURNALS AND PERIODICALS.

SWEDEN.

Lund. Acta Universitatis Lundensis, 1864. Philosophie Sprakvetenskap, och historia und Mathematik och Naturvetenskap. 1864–65. From the University.

Stockholm. Kongliga Svenska Vetenskaps-Akademiens Handlingar. Ny Följd, Femte Bandet, Forste Häftet. From the Society.

Ofversigt af kongl. Vetenskaps-Akademiens Forhandlingar. Argängen 1—4 and 21 Argängen. From the Society.

Upsal. Nova Acta Regiæ Societatis Scientiarum Upsaliensis. Seriei Tertiæ, Vol. V., Fasc. 2, 1865. From the Society.

DENMARK.

Kjobenhavn. Oversigt over det Kongelige danske Videnskabernes Selskabs Forhandlinger Aaret 1865, Nos. 1—3; 1866, No. 1. From the Society.

Videnskabelige Medelelser fra den Naturhistoriske Forening i Kjobenhavn for Aarat. 1865. From the Society.

Naturhistorisk Tidsskrift. 4de Binds, 3bie—6to Haefte. Ny Raekke 1ste Binds, 1ste—3bie Haefte. Presented by Edw. Wilson, Esq.

NORWAY.

Christianiæ. Det Kongelige Norske Fredericks Universitets, Aarsberetning for Aaret 1863. From the University.

RUSSIA.

Moscow. Bulletin de la Societe Imperiale des Naturalistes de Moscow. Annee 1865, Nos. 2 to 4; Annee 1866, No. 1. From the Society.

Memoirs de L'Academie Imperiale des Sciences. Tome 5, No. 1, to Tome 10, No. 2. From the Society.

Bulletin de L'Academie Imperiale des Sciences. Tome 5, No. 2, Tome 7, No. 3, to Tome 9. From the Society.

Verhandlungen der Kon. Gesellschaft für die Gesammte Mineralogie zu St. Petersburg. Jahrg., 1863. From the Society.

Nova Acta Academia Scientiarum Imperialis Petropolitanae. Vols. 1—6 and Vol. 11 From the Society.

HOLLAND.

Amsterdam. Jaarbock van de Koninklijke Akademie van Wetenschappen. 1863 and 1864. From the Society.

Bijdragen tot de Dierkunde uitgegeven door het Genootschap Natura Ar-

tis Magistra. 1851, Tweede and Derde Afl; '1852, 4de and 5de Afl. Presented by Edw. Wilson, Esq.

Verhandelingen van de k. Academie van Wetenschappen. Tiende Deel. Amsterdam. 1864. From the Society.

Verslagen en Mededeelingen de Koninklijke Akademie van Wetenschappen, 1863 & 1864, 8te deel 1865. Amsterdam. From the Society.

Arnheim. Nederlandsch Tigdschrift voor Jagtkunde. 1ste Jahrg. 3de to 12mo, Afl. Presented by Edw. Wilson, Esq.

GERMANY.

Altenburg. Mittheilungen aus dem Osterlande, Gemeinschaftlich herausgegeben vom Gewerbe-Vereine, von der Naturforschenden Gesellschaft zu Altenburg. Banden 7er to 13er and 17er Band, 1es and 2es Heft. From the Society.

Augsburg. Achtzehnter Bericht des Natur-historischen Vereins. From the Society.

Berlin. Physikalische Abhandlungen der k. Akademie der Wissenschaften zu Berlin. Aus dem Jahre., 1864. From the Akademie.

Linnæa Entomologica. 11er & 12er Banden. Presented by Edw. Wilson, Esq.

Archiv für Naturgeschichte Jahrgangen, 1er—29er complete. 30er Jahrg., 1es Heftes, Berlin 1835—1864. Presented by Rathmell Wilson, Esq.

Same. 30er Jahrg., 5es & 6es Heft. From the Editors.

Berliner Entomologischer Zeitschrift, herausgegeben von dem Entomologischen Vereine in Berlin. Neunter Jahrg. Vierteljahrsheft. 9er Jahrg., 2es—4es Vierteljahrsheft. 10er Jahrg. From the Society.

Wochenschirft des Vereines für Gartnerei und Pflanzenkunde. 8 Jahrg., Nos. 31 to 52. From the Society.

Zeitschrift für die Gesammten Naturwissenschaften herausgegeben von dem Naturw.-Vereine für Sachsen und Thüringen in Halle. Jahrgangen, 1864 and 1865. From the Society.

Zeitschrift der Deutschen Geologischen Gesellschaft. 17 Band, 2es Heft, to 18 Band, 1es Heft. From the Society.

Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin aus den Jahren, 1860 bis 1862. 1865. From the Society.

Monatsbericht der K. P. Akademie der Wissenschaften zu Berlin. Jan., 1866, to June, 1866. From the Society.

Bonn. Verhandlungen des Naturhistorischen Vereines der Preussischen Rheinlande und Westphalens. Jahrgangen 7er, 11er and 22er, 1850, 1854 and 1865. From the Society.

Brunn. Verhandlungen des Naturforschenden Vereines in Brunn. II. and III. Banden. From the Society.

Bremen. Erster Jahresbericht des Naturwissenschaftlichen Vereines zu Bremen. From the Society.

IX. Jahres-Bericht des Instituts für Schwedische Heil Gymnastik in Bremen von Dr. Axel Sigfrid Ulrich. From the Editor.

Cassel. Malakozoologische Blatter. Herausgegeben von Dr. Louis Pfeiffer. 10er Band, pp. 177 to end; 12er Band and 13er Band, pp. 1—32. From the Library Fund.

Journal für Ornithologie. Herausgegeben von Dr. Jean Cabanis und Dr. Ed. Baldamus. 13 Jahgr., Heft 1, to 14 Jahgr., Heft II. From the Library Fund.

Danzig. Neueste Schriften der Naturforschenden Gesellschaft in Danzig. 5en Bandes, 1es Heft. Presented by Edw. Wilson, Esq.

Darmstadt. Notizblatt des Vereines für Erdkunde. III. Folge, IV. Heft. From the Society.

Dresden. Sitzungs-Berichte der Naturwissenschaftlichen Gesellschaft Isis zu Dresden. 1861—1864. From the Society.

Novorum Actorum Academiæ Cæsareæ Leopoldino-Carolinæ Germanicæ Naturæ Curiosorum. Tome 24. From the Society.

Erster Jahresbericht des Vereins für Erdkunde zu Dresden. From the Society.

Düsseldorff. Der Gesellschaft Naturforschender Freunde Westphalens. Neue Schriften. Erster Band. Presented by Edw. Wilson, Esq.

Frankfurt-am-main. Der Zoologische Garten. Nos. 7 to 12, 1865. From the Editor.

Same. 1, 2 and 3 Jahrg. From Rathmell Wilson, Esq.

Jahresbericht ueber die Verhaltung des Medicinalwesens die Krankenanstalten. Herausgegeben von dem Aerztlicken Verein. VI. Jahrg., 1862. From the Society.

Freiburg im Br. Berichte über die Verhandlungen der Naturforschenden Gesellschaft zu Freiburg. Band III., Heftes III. and IV. From the Society.

Giessen. Amtlicher Bericht über die neun und dreissigste Versammlung Deutscher Naturforscher und Arzte in Giessen. From the Convention.

Elfter Bericht der Oberhessischen Gessellschaft für Natur und Heilkunde. From the Society.

Gotha. Mittheilungen aus Justus Perthes Geographischer Anstalt über wichtige neue Erforschungen auf dem Gesammtgerrete der Geographie von Dr. A Petermann. 1866, IV—VIII. From the Library Fund.

Gottingen. Nachrichten von der K. Gesellschaft der Wissenschaften und der Georg.-Augusts Universität aus dem Jahre, 1865. From the Society.

Graz. Zweiter Jahresbericht des Vereines der Aerzte in Steiermark. From the Society.

Halberstadt. Museum Heineanum von Dr. Jean Cabanis. 1 Theil, 1850–51. Presented by Edw. Wilson, Esq.

Konigsberg. Schriften der K. Physikalisch Ekonomischen Gesellschaft zu Konigsberg. 5es Jahgrang, 1es and 2es Abth. From the Society.

Leipzig. Berichte über die Verhandlungen der K. Sachsischen Gesellschaft der Wissenschaften zu Leipzig, Mathematisch Physische Classe 1864. From the Society.

Des VII. Bandes der Abhandlungen der Mathematisch Physischen Classe der K. Sachsischen Gesellschaft der Wissenschaften. From the Society.

Jenaische Zeitschrifte für Medicin und Naturwissenschaft herausgegeben von der Medicinisch-Naturw. Gesellschaft zu Jena. 2er Band, 1es—4es Heftes. From the Society.

Archiv für Anatomie Physiologie und Wissenschaftliche Medecin. Herausgegeben von Drs. Reichert und Bois Reymond. From 1863, No. 1, to 1866, No. 3. From the Library Fund.

Zeitschrift für Wissenschaftliche Zoologie. Herausg. von Carl S. V. Siebold und Albert Kölliker. 16er Band, 2es Heft. From the Library Fund.

The same. Banden I.—XI. From Rathmell Wilson, Esq.

Jahrbucher für wissenschaftliche Botanik. 4er Band, 3es Heft. From the Executors of the late Dr. Thos. B. Wilson.

Mannheim. Achtzehnter to 26er and 31er Jahresberichtes des Mannheimer Vereines für Naturkunde. From the Society.

München. Annalen der Koniglichen Sternwarte bei München. XIV. Band. From the Society.

Abhandlungen der Philosophischen Classe der K. B. Akademie der Wissenschaften. 10en Bandes, 2es Abth. Historischen Classe. 10en Bandes, 1 and 2 Abth. From the Society.

Sitzungsberichte of the same, 1865. No. 3 of Second part wanting. From the Society.

Nassau. Sechster Jahres-Bericht des Natur-historischen Vereins in Nassau. From the Society.

Neubrandenburg. Archiv des Vereins der Freunde der Naturgeschichte in Meklenburg. 19 Jahrgang. From the Society.

Regensburg. Correspondenz-Blatt des Zoologisch-Mineralogischen Vereines in Regensburg. 19er Jahrgang. From the Society.

St. Polten. Erstes und zweites Programm der Nö Landes-Ober Realschule in St. Polten. From the Society.

Jahresbericht des Turnvereins in St. Polten für das Zweite Vereinesjahr. From the Society.

Stuttgart. Correspondenzblatt des K. Wurttembergischen Landwirthschaftlichen Vereins. Neue Folge. Band 18, Jaghr., 1840. 1es Heft. Presented by Edw. Wilson, Esq.

Neues Jahrbuch für Mineralogie, Geologie und Palaeontologie. Jahrg., 1865, 4es Heft, to Jahgr., 1866, 3es Heft. From the Editors.

Wien. Verhandlungen der K. K. Zoologisch-botanischen Gesellschaft in Wien. Jahrg., 1865, 15 Band. From the Society.

Sitzungsberichte der K. Akademie der Wissenschaften, Math. Naturw. Classe. L. Band, II. Heft, to LII. Band, V. Heft. From the Society.

Register zu den Bänden 13 bis 50 der Sitzungsberichte der Math.-Naturw. Classe V. Wien, 1865. From the Society.

Denkschrift der K. Akademie der Wissenschaften, Mathem.-Naturwissenschaftliche Classe. 24er Band. From the Society.

Jahrbuch der K. K. Geologischen Reichsanstalt. 1865. No. 3, to 1866, No. 2. From the Society.

Mittheilungen der K. K. Geographischen Gesellschaft. Jahrgagen I—VII. Jahrg. VIII., Heft, I. From the Society.

Wiesbaden. Jahrbücher des Vereins für Naturkunde im Herzogthum Nassau. 17es and 18es Heft.

Würzburg. Würzburger Naturwissenschaftliche Zeitschrift. Herausgegeben von der Physikalisch-Medicin. Gesellschaft. Sechste Band, 1e Heft, and 1e and 2e Bänden. From the Society.

Canstatts Jahresbericht über die Leistungen in den Physiologischen Wissenschaften in allen Ländern im Jahre 1864. From the Executors of the late Dr. Thos. B. Wilson.

Sitzungs-Berichte der Physicalish-Medicinischen Gesellschaft für das Jahre 1860. From the Society.

SWITZERLAND.

Basel. Verhandlungen der Naturforschenden Gesellschaft in Basel. 4er Theil, 2es Heft, From the Society.

Bern. Mittheilungen der Naturforschenden Gesellschaft in Bern aus dem Jahre 1865. From the Society.

Geneva. Bibliotheque Universelle et Revue Suisse Archives des Sciences Physiques et Naturelles. Nouvelle Période. Tome 24me, No. 95, to Tome 26me, No. 104. From the Editor.

Bulletin de la Société Ornithologique Suisse. Tome 1er, 1er Partie. From the Society.

Memoirs de la Société de Physique et d'Histoire Naturelle de Geneva. Tome 18, 1re Partie. From the Society.

Actes de la Soc. Helvetique des Sciences Naturelles. 49me Session. Compte Rendu, 1865. From the Society.

Lausanne. Bulletin de la Société Vaudoise des Sciences Naturelles. Tome 8, Bulletin No. 53 and 54. From the Society.

Neuchatel. Bulletin de la Société des Sciences Naturelles de Neuchatel. Tome 7, 1er cahier. From the Society.

St. Gallen. Bericht über die Thätigkeit der St. Gallischen Naturwissenschaftlichen Gesellschaft während des Vereinigsjahres 1863–64. From the Society.

FRANCE.

Bordeaux. Actes de L'Academie imperiale des Sciences, belles-lettres et arts de Bordeaux. 3e Serie, 27e Année, 1er to 3me Trimestre. From the Society.

Actes de la Société Linnéenne de Bordeaux. Tome 25, 3me Serie. Tome 5, IV., V. and VI. Livrs. From the Society.

Boulogne. Procés Verbal de la Séances Publique de la Société d'Agriculture, etc., de Boulogne sur Mer. Année 1823. Presented by Edw. Wilson, Esq.

Cherbourg. Mémoirs de la Société Imperiale des Sciences Naturelles. Tome XI. From the Society.

Paris. Annales des Sciences Naturelles, Cinquieme Serie, Zoology. Tome IV., No. 3; Botanique, Tome III., No. 6, to Zoologie, Tome VI., No. 2; Botanique, Tome V., No. 2. From the Library Fund.

Annales des Mines. Sixieme Serie. 3e Livr. de 1865 to 6me Livr. de 1866. From the Minister of Public Works, France.

Bulletin mensuel de la Société Imperiale Zoologique D'Acclimatation. 2me Series. Tomes II. and III. From the Library Fund.

Journal de Conchyliologie. Publie sous la direction de MM. Crosse et Fischer. 3e Serie. Tome 5, No. 4, and Tome 6. Nos. 1 and 2. From the Editors.

Same. Tome 1er to 3me Series, Tome II. Ten Volumes.

Journal de la Physiologie de l'Homme et des Animaux. No. 24. Oct. 1863, and Tome 6me. From the Library Fund.

Archives du Museum d'Histoire Naturelle. Tome 8. Livr. 3. Tomes 9 and 10. From the Library Fund.

Comptes Rendus hebdomadaires des Séances de L'Academie des Sciences. Tome 60, Nos. 13 to 18 and 25 and 26; Tome 61, Nos. 1—24. Tables of Vol. 59. From the Executors of the late Dr. Thos. B. Wilson.

Same. Tome 49 to No. 12 of Tome 60, and ten numbers of Tome 61. From Rathmell Wilson, Esq.

Revue des Cours Scientifiques de la France et de l'Etranger. 2me Année. Paris, 1864—1865. From the Library Fund.

Mémoires de L'Academie Royale des Sciences de L'Institute de France. 4to Tomes 1 to 34 inc. Années 1816 to 1864. Paris, 1818—1864. Tome 29 wanting. Presented by Rathmell Wilson, Esq.

Bulletin de la Société Ethnologique. Année 1847. Presented by Edw. Wilson.

Comptes Rendus des Séances et Mémoirs de la Société de Biologie. Tome 1er de la 4me Serie. From the Society.

Revue et Magasin de Zoologie pure et appliquée. Recueil mensuel par M. F. E. Guerin Meneville. From 1865, No. XV., to 1866, No. 10. From the Editor.

BELGIUM.

Bruxelles. Annuaire de l'Academie Royale des Sciences, des Lettres et des Beaux Artes 1865. 31me Année. From the Academy.

Mémoires Couronnes et Autres Mémoires published by the same. Collection in 8vo, Tome 17me. 4to Tome 32. From the Academy.

Bulletin of the same. Tomes 18 and 19. 33me et 34me Années. 2me Serie. From the Academy.

Liege. Mémoires de la Société Royale des Sciences de Liege. Tomes 19 and 20. From the Society.

Louvain. Annuaire de l'Universite Catholique de Louvain. 1846—1848, 1852—1854, 1865, and 1866. From the Society.

ITALY.

Bologna. Rendiconto delle Sessioni dell' Academia delle Scienze delle Istitut' di Bologna. Anno Accademico, 1864—1865. From the Academy.

Mémoires of the same. Series II. Tome IV. Fasc. 2, 3, 4. Tome V. Fasc. 1 and 2. From the Academy.

Torino. Memorie della Reale Accademia delle Scienze di Torino. Serie Seconda. Tomo 21. From the Society.

Atti della R. Accademia delle Scienze di Torino. Vol. I. Disp. 1 and 2. From the Society.

PORTUGAL.

Lisbon. Memorias da Academia. Real das Sciencies de Lisboa. Sciencias. Mathematicas, Physicas e Naturaes. Nova Serie. Tome III. Pt. II. From the Academy.

Historia i Memorias da Academia Real das Sciencias de Lisboa, Classe de Sciencies moraes politicas e Bellas-Lettras. Nova Serie. Tome III. Pt. II. From the Academy.

GREAT BRITAIN AND IRELAND.

Dublin. The Journal of the Royal Dublin Society. No. 34. Dec. 1865. Also Parts 1 to 17. From the Society.

Journal of of the Royal Geologial Society of Ireland. Vol. 1, parts 1 and 2. From the Society.

Transactions of the Royal Agricultural Improvement Society of Ireland. 1843. Presented by Edw. Wilson, Esq.

Report of the Royal Zoological Society of Ireland. 1847. Presented by Edw. Wilson, Esq.

Proceedings of the Royal Dublin Society. Vols. 85 and 86. Presented by Edw. Wilson, Esq.

Transactions of the Dublin University Philosophical Society, Dublin. Vol. 3. 1848. Presented by Edw. Wilson, Esq.

The Dublin Philosophical Journal. No. 6. Nov., 1826. Presented by Edw. Wilson, Esq.

Proceedings of the Royal Irish Academy. Vol. 8 and Vol. 9, pt. 1. From the Society.

The Transactions of the Royal Irish Academy. Vol. 24. Science, part 5. Polite Literature, part III. Antiquities, parts 5, 6 and 7. From the Society.

Durham. Report of the Natural History Society of Northumberland and Durham. 1832. Presented by Edw. Wilson, Esq.

Edinburgh. Transactions of the Botanical Society. Vol. 8, pt. 1. From the Society.

Annual Reports and Proceedings of the Botanical Society of Edinburgh. 1838—41. Presented by Edw. Wilson, Esq.

Proceedings of the Royal Society. Sessions 1862—1865—1866. Presented by Edw. Wilson, Esq.

Transactions of the Royal Society. Vol. 22, pt. 1. From the Society.

Leeds. Report of the Proceedings of the Geological and Polytechnic Society of the West Riding of Yorkshire. 1852—1854, 1865. From the Society.

Philosophical and Literary Society. The Annual Report. 1864—1865. From the Society.

Catalogue of the Library of the Philosophical and Literary Society. 1865. From the Society.

London. Notes and Queries. Parts 43 to 55. From the Editor.

The Journal of the Royal Asiatic Society of Great Britain and Ireland. Vol. 17, pt. 1, to New Series Vol. II., part 1. From the Society.

Philosophical Transactions of the Royal Society of London. Vol. 154, pt. 3, and Vol 155, pt. 1. From the Society.

Proceedings of the Royal Society. Vol. 14, Nos. 70 to 77. From the Society.

The Transactions of the Entomological Society. 3d Series, vol. III., part 2, to vol 5, part 3. From the Society.

Proceedings of the Royal Institution of Great Britain. Vol. 4, parts 5 and 6. From the Society.

Proceedings of the Scientific Meetings of the Zoological Society. From 1865, part 1, to 1866, part 1. Index 1848 to 1860. From the Society.

Transactions of the Zoological Society, London. Vol. 5, part 5. From the Society.

Report of the Council of the Zoological Society, London. 1865. From the Society.
The Popular Science Review. Edited by Jas. Samuelson. Vols. 1 to No. 20. 1866. From the Library Fund.
The Annals and Magazine of Natural History. Nos. 92 to 104. From the Library Fund.
Proceedings of the Royal Geographical Society. Vols. 1 to 9, except No. 1 of vol. 4. From the Society.
Journal of the same. Vols. 21 to 34 inc. 1851—1864. From the Society.
The Transactions of the Linnean Society of London. Vol. 24, part 3, to vol. 25, part 2. From the Society.
The Journal of the Linnean Society. Zoology. Vol. 8, No. 30, to vol. 9, No. 33. From the Society.
Quarterly Journal of Microscopical Sciences. New Series, No. 21 to 23. From the Library Fund.
The Journal of the Society of Arts and of the Institutions in Union. Vol. 13. From the Society.
The Anthropological Review. 1865. Nos. 9, 10 and 11. From the Executors of the late Dr. Wilson.
The Quarterly Journal of the Geological Society. Vol. 21, part 3, to vol. 22, part 3. From the Society.
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